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Engineering Department
Quality Assurance Division

TENANT CONSTRUCTION REVIEW MANUAL

MARCH 1997

Engineering Department

THE PORT AUTHORITY OF NY & NJ

TENANT CONSTRUCTION REVIEW MANUAL

MARCH 1997

SECTION 1

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Historical Notes:
First published 1971, Rev. 1979; updated March 1984, Rev. March 1990.

LIST OF ATTACHMENTS

A1	Standard for Interior Plastic Signs
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SECTION 2

INTRODUCTION

This Manual presents the technical criteria to be followed by Tenants, and their architectural and engineering consultants, at all Port Authority (PA) facilities in connection with construction work undertaken by a Tenant. These technical criteria are in addition to other requirements contained in the lease agreement between the Port Authority and the Tenant. This Manual also covers the Port Authority Engineering Department's scope-of-review of the design documents (plans, specifications, calculations and other documents) submitted by Tenants in connection with proposed construction or alterations. It shall not be deemed to imply that there will not be additional reviews by other Port Authority Departments.

The Design Standards (Tenant Construction Review) Unit of the Engineering Department's Quality Assurance Division will review the Tenant Construction or Alteration Application submitted by the Tenant in accordance with the criteria contained in this Manual. The responsibility for architectural and engineering design shall remain with the Tenant's Architect or Engineer (A/E) of record. The Design Standards Unit will not impose design solutions but will only comment on the design presented.

Reviews will not address the proposed aesthetic or functional aspects of the design.

Construction documents for Tenant construction or alterations will be reviewed by the Design Standards Unit for compliance with all applicable Codes and Port Authority Technical Standards. In the absence of a specific code provision, this Manual sets forth the applicable standards to be followed by Tenants except as may otherwise be required. All design documents shall reflect the existing construction as well as the proposed work in order to determine compatibility with existing facility conditions.

In this regard, a list of all reference documents and guidelines which the Facility has provided to the Tenant, and which affect the design, should become an integral part of he Tenant's contract document submission. If the review process will be aided by the inclusion of these reference documents, such documents should also be included in the submission.

SECTION 3

GENERAL REQUIREMENTS

I. All proposed Tenant construction shall be submitted for review, in completed form, accompanied by a "Tenant Construction or Alteration Application," Form PA531, which shall be provided to the Tenant by the appropriate Port Authority line department.

The PA line department shall forward all tenant submittals to the Engineering Quality Assurance Division with a completed Tenant Alteration Application Review Request Form, PA2127, indicating the technical disciplines to be reviewed for the submitted project(s).

II. The design documents, such as drawings, reports, computations and specifications, required in connection with the proposed construction, shall be attached to, and form a part of, the Tenant Construction or Alteration Application, and shall reflect the existing construction as well as the proposed work. The design documents shall be sealed and signed by the architect or engineer of record licensed to practice in the State in which the proposed construction is to be performed. The architect/engineer indicated on the Application shall be considered the Architect or Engineer (A/E) of record.

The A/E of record is responsible for assuring that the documents prepared and submitted by other consultants are properly coordinated.

Where other consultants have been acknowledged by the A/E of record, either in the Tenant Alteration Application or on the drawings, said consultants may seal and sign the documents they have prepared.

Where the Tenant retains two or more independently functioning consultants, they each become an A/E of record for their respective scope of work. Each consultant will be required to submit a separate Tenant Alteration Application, and each consultant shall seal and sign their respective documents.

Responsibility for design or code compliance shall not be delegated to contractors.

III. All revisions to previously submitted documents shall be properly identified, and shall be accompanied by a brief description of the revisions.

IV. All voluntarily installed Fire Protection systems, including, but not limited to sprinklers, alarms, etc., shall comply with the provisions of the applicable Building Codes for such systems.

V. Fire protection plans, as described in the New York City Building Code Section 27-228.1 et seq., shall be filed for review along with other design documents for construction projects at all Port Authority facilities. After approval of the project for construction, and before a Permit to Occupy or Use is issued, the Tenant shall submit one (1) copy of these plans to the Manager of the Facility where the project is located, one (1) copy to Risk Management, and two (2) copies to the Quality Assurance Division of the Engineering Department.

VI. In accordance with the policy of the Port Authority of New York and New Jersey, the Tenant shall comply with the provisions of all federal, state, municipal, local and departmental laws, ordinances, rules, regulations and orders that may affect the construction or alteration contract and all individuals involved therein. Where stricter requirements apply, i.e., those contained in the specifications or drawings, they shall be followed. The Tenant, or designated agents, shall not apply for any variance, license, waiver or permit in the name of or on behalf of the Port Authority.

SECTION 4

CONCEPTUAL REVIEW

I. GENERAL

At the Tenant's request, a Conceptual Review will be performed to supplement the consultants' feasibility studies. These reviews will inform the consultants of established design criteria, pre-existing conditions that determine code compliance, and Port Authority requirements affecting the proposed work. The conceptual review shall be limited to fundamental concepts and items related to the criteria in this Manual that may significantly affect the design. The review will not address aesthetics or functional design.

Submitted conceptual plans shall indicate conformance to the applicable codes and design criteria.

The scope of the Conceptual Review may include the items enumerated in the following paragraphs:

II. BUILDING CODE

A. Occupancy group and construction classification of the new, altered, and adjusted areas.

B. Fire protection of spaces in the building as it applies to ratings of interior separations, shafts, exterior walls, and sprinkler requirements.

C. Egress: Occupant load and adequacy of egress shall be established or the Tenant's architect/engineer may list the sections of the applicable Code on which the design is based. New Tenant egress scheme(s) shall be coordinated with existing conditions.

D. Special structural conditions, including foundations.

E. Special or unusual mechanical or electrical problems affecting environmental, energy, or power requirements.

F. Deviations from Code requirements.

G. Existing structures shall be reviewed for existing Code violations.

III. PANY/NJ CRITERIA

See the subsequent Technical Sections of this Manual for specific criteria.

IV: COORDINATION WITH FACILITIES

A. Electrical: New power requirements shall be indicated.

B. Water supply: Coordination of any demand for chilled water, high temperature hot water, domestic water, high pressure sprinkler supply water, and connections to the fire protection loop, shall be fully described.

C. Any work affecting fuel lines shall be indicated.

SECTION 5

ARCHITECTURAL

I. GENERAL

The scope of the architectural review shall comprise compliance with the applicable codes, standards, and Port Authority design criteria listed below.

II. CODES AND REGULATIONS

A. New York City:

1. New York City Building Code and its Reference Standards.
2. New York City Fire Prevention Code and Directives.
3. New York City Local Laws.
4. Rules of the Board of Standards & Appeals (BS&A).
5. New York State Labor Laws.
6. New York State Multiple Dwelling Laws (Hotels).
7. New York State Energy Conservation Construction Code.
8. Directives and Memoranda of the Department of Buildings.

B. New Jersey:

1. New Jersey Uniform Construction Code, its bulletins and the sub-codes (BOCA, etc.), with their Supplements and Reference Standards.
2. New Jersey Uniform Fire Code.

C. The City of Yonkers:

1. Prior to 6/2/89: The Code of the City of Yonkers.

2. After 6/2/89: New York State Uniform Fire Prevention and Building Code.

D. All PA Facilities:

1. Americans with Disabilities Act (ADA).

2. Applicable Flood Controls.

III. STANDARDS

The latest editions of the following National Fire Protection Association (NFPA) fire codes shall be used as reference standards: Number 409 for hangars, Number 416 for terminal buildings, Number 417 for aircraft loading walkways, and Number 75 for computer rooms.

IV. PORT AUTHORITY DESIGN CRITERIA

A. General:

1. In unsprinklered areas, upholstered materials, furniture and draperies shall conform to the specifications governing flammability. See Attachments A2, A3, and A4.

2. All baggage handling areas and conveyor spaces inaccessible to fire fighting equipment shall be provided with a sprinkler system. Spaces over all types of ceilings are considered inaccessible.

3. Conveyor belting shall be flame resistant. When subjected to a flame test in accordance with ASTM D378, the duration of flame shall not exceed an average of one minute after removal of the applied flame (afterflame time) and the duration of afterglow shall not exceed an average of three minutes. Test results shall be submitted for review.

4. Storage under canopies (such as at cargo buildings) shall be considered as storage occupancy, moderate hazard.

5. Baggage handling (as opposed to storage) spaces shall be classified as occupancy group B-2 in New York City, and S-2 in New Jersey.

6. For Interior Plastic Sign Standard, see Attachment A-1.

B. Airports:

1. General:

a. The means of egress for passenger terminal buildings shall be designed for an occupant load consisting of the sum of the passengers (100% occupancy of aircraft), meeters and greeters, and employees, based on maximum anticipated flight schedules (such as holidays or other seasonal peaks), and a two (2) hour delay of flights. This number shall not be less than 5C, where C is the capacity of all aircraft that can be unloaded simultaneously (as indicated in the New York City Building Code Table 6-2). Consideration shall be given to locations of concentrated crowding, rather than assuming uniform distribution of occupants over the entire building.

b. In passenger terminal buildings, concessions serving the public shall be considered as part of the public space. Storage space belonging to concessions shall be enclosed as required by Code. Also, adjacent concession areas shall be separated from each other as required by Code for different tenancies.

c. For aircraft loading walkways, and for protection of buildings from rampside fuel spill fires, see Section 13 of this Manual.

d. Protection and fire rating of building walls and overhangs adjacent to aircraft fuel pipeline surge suppressors shall be in accordance with NFPA 30

and shall be designed to have a fire rating depending on their distance 'd' as a radius from the surge suppressor:

d > 25 feet; fire rating = 0
d > 10 feet; fire rating = 2 hours
d < 10 feet; fire rating = 4 hours.

2. Kennedy Airport, International Arrivals Building:

   a. The International Arrivals Building (IAB) conforms to construction classification 1B, with a nominal fire rating of three (3) hours.

   b. On the third (3rd) floor of the IAB, an existing "Exterior Passageway" provides a means of egress from the floor.

   c. In the IAB, where basic egress conforms to the 1938 Code, stairs are provided from each floor on the basis of 75% Tenant Space used as assembly (1 person per 10 sf) and the remaining 20% used as office (1 person per 100 sf).

3. LaGuardia Airport, Central Terminal Building:

   a. The main building conforms to construction classification 1B.

   b. The fingers are unprotected steel construction, classification 1E, separated from the main building, and are further subdivided into fire areas.

   c. On the third (3rd) floor of the Terminal Building, a Safe Area, in compliance with Article 8 of the 1968 Code, constitutes part of the overall means of egress from the floor. The Safe Area consists of the central east-west corridor together with the public areas at the termination of the connectors from the parking garage.

C. Port Authority Bus Terminal:

The design of Tenant areas opening into the Main Concourse shall conform with New York City Building Code Section 27-370(h) (3)d.3 for "Street Floor Lobbies."

V. DETAILS OF ARCHITECTURAL REVIEW

The following are representative of items reviewed:

A. Existing violations.

B. Occupancy (use) of spaces, construction classification (hourly rating of the structure), and their compatibility.

C. Requirements of sprinklers, standpipes, smoke detectors, fire alarms, and exit signs.

D. Provisions for the handicapped.

E Compartmentation of spaces (rated separations, shafts, etc.).

F. Fire protection of building components and finishes (includes documentation verifying that all materials and equipment used are of an approved type).

G. Egress, establishing occupant load and existing capacity, including door and hardware requirement.

H. Verification of strength of all glass subject to human impact, and the requirement for markings.

I. Provision of plumbing fixtures (toilets, lavatories, drinking fountains, etc.).

J. Application of NFPA (National Fire Protection Association) Codes to hangars, terminal buildings, aircraft loading walkways, and computer rooms.

K. Protection of airport buildings from fires at rampside points of potential fuel spillage (fuel hydrants, fill and vent points, and catch basins). See Section 13 of this Manual.

L. The applicability of PA Standards and Specifications governing the Flammability of Plastic signs, Drapery, Upholstery and Plastic Furniture. See Attachments A1 through A4.

M. Code requirements for Tenant's consultant's inspection responsibilities. See Section 14 of this Manual.

N. Requirement of architect's or engineer's seal, signature, and address on drawings and design documents.

O. In conveyor systems, it is required that positive means be designed to ensure the prevention of obstructions interfering with the closing of fire shutters. These fire shutters shall be integrated with:

1. Smoke detectors, conveniently located for detection in order to actuate the motorized doors and the alarm system.

2. Leading edge or electric eye devices to permit the passage of an obstruction on the conveyor by retraction of the conveyor door.

3. Emergency power for the operation of the rated door(s), as well as for an adequate portion of the conveyors, to enable the passage of obstructions at the rated door(s).

4. Stoppage of the conveyors.

5. Operation of other smoke and heat detectors within the fire zone shall also actuate these doors.

P. Where spaces are provided with grilled openings for entrance and exiting, a safe means of egress shall be provided for the employees who may stay inside the space after the grille is closed, consisting of:

1. A door in compliance with code requirements; or

2. An approved device that will open the grille from inside.

SECTION 6

STRUCTURAL

I. GENERAL

A. The scope of the structural review shall comprise compliance with the applicable Codes, standards, and design criteria listed below.

B. Computations shall be submitted with all structural plans.

II. CODES AND REGULATIONS

A. New York City:

1. New York City Building Code.

2. Rules of the City of New York, Title 1, Department of Buildings.

B. New Jersey:

New Jersey Uniform Construction Code (NJUCC).

C. City of Yonkers:

New York State Uniform Fire Prevention and Building Code.

III. STANDARDS

AASHTO	American Association of State Highway and Transportation Officials.
AREA	American Railway Engineering Association.
ANSI/EIA/TIA-222-E	Structural Standards for Steel Antenna Towers and Antenna Supporting Structures.

IV. PORT AUTHORITY DESIGN CRITERIA

A. In the absence of provisions for earthquake design in the New York State Uniform Fire Prevention and Building Code, the New York City Building Code Shall be used for earthquake design in the City of Yonkers.

For modifications to the New York City Building Code Earthquake Loads, See Attachment S3.

B. Floors in certain areas of the Port Authority Bus Terminal South Wing are of light weight low strength concrete construction. Concrete anchors are not permitted in these light weight slabs for the attachment of hangers for supporting ducts, utilities, ceilings, and other miscellaneous loads. These loads shall be supported directly from floor beams or supplementary framing connected to the floor beams. Information regarding the locations of the light weight slabs can be obtained from the Facility Tenant Liaison Office.

In areas where concrete inserts are permitted, only approved type stainless steel anchors rated for shock and vibration loads and elevated temperature shall be used.

C. Ceilings:

1. Plaster Ceiling Design Standards - see Attachment S1.

2. Lightweight Ceiling Design Criteria - see Attachment S2.

D. Vehicular Traffic:

1. Elevated roadways shall be designed for all loadings, including seismic effects, in accordance with the AASHTO "Standard Specifications for Highway Bridges" and the relevant State DOT Standards. In New Jersey, roadways providing access to interstate freight shall be designed for HS 25 loading.

2. The minimum loading for the departure and arrival ramps servicing airport passenger terminals shall be HS 15-44

AASHTO highway loading. All other ramps servicing cargo facilities or road overpasses shall be designed for HS20 AASHTO highway loading.

E. Highway Signs and Luminaries:

Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals; American Association of State Highway and Transportation Officials (AASHTO).

F. Aircraft Loading Walkways (Airports):

1. Minimum Live Loads: Floor (LL) - 40 psf or a concentrated load of 300 lbs. Roof (RLL) - as per local code.

2. Minimum Wind Loading (WL) 12.5 psf lateral for the extended (operational) mode (combined windward and leeward pressure). 25 psf lateral for the retracted (stowed) mode (combined windward and leeward pressure).

3. Load Combinations:

a. Extended: DL + LL + RLL
DL + LL + 1/2RLL + WL
DL + WL

b. Retracted: DL + RLL
DL + RLL + WL
DL + WL

4. Minimum Stability Factors:

Overturning	1.5
Sliding	1.5
Uplift	1.5

V. DETAILS OF STRUCTURAL REVIEW

The following are representative of items reviewed:

A. The design calculations shall include but not be limited to:

1. Design criteria and applicable Codes.
2. Reference Standards.
3. Materials.
4. Type of Construction and foundations.
5. Design loads, including wind and other forces.
6. Machinery and equipment loads in excess of 1000 lbs. Including an evaluation of any potential vibration.
7. Allowable soil bearing capacity.
8. Pile type and capacity.
9. Design and details of all connections other than AISC standard framed or seated beam connections.
10. Location and details of expansion joints.
11. Bracing systems and moment-resisting frames.
12. Deflections and wind drift.
13. Ponding.
14. Investigation and superimposed loads from new construction on existing structure and foundation.
15. Investigation of existing structural system and foundations under additional loads due to alterations.
16. Where it has been established that post-construction settlements of foundations are to be monitored, the

monitoring program, the limits of differential settlement that the structure can tolerate, and the necessary adjustments shall be submitted for review.

B. Drawings shall include, but not be limited to, the following information:

1. Applicable Code and Reference Standards.

2. Materials.

3. Design live loads, wind, and other forces.

4. Machinery, equipment, and other concentrated loads in excess of 1000 lbs. Including footprints or support layout(s).

5. Allowable soil bearing capacity.

6. Pile type, capacity, and minimum tip elevation.

7. Column schedule showing accumulated design load at each level for dead and live loads.

8. Stress diagram(s) for trusses.

9. Datum and ground water elevations.

10. Typical moment connection details.

11. Details of non-standard connections.

12. Construction sequence.

C. Specifications shall include, but not be limited to:

1. The scope of work and materials required for the construction or alteration.

2. Limitations and restrictions due to the existing conditions and/or requirements for the methods of construction or staging.

SECTION 7

GEOTECHNICAL

I. GENERAL

The scope of the geotechnical review shall be for compliance with the applicable codes, standards, and design criteria listed below. The review will include the supporting soil characteristics and the choice of a foundation system compatible with the structure to be supported. In the absence of definitive code requirements, P.A. standards and established practice will apply.

II. CODES AND REGULATIONS

A. New York City:

New York City Building Code.

B. New Jersey:

New Jersey Uniform Construction code (NJUCC).

C. City of Yonkers:

New York State Uniform Fire Prevention and Building Code.

III. STANDARDS

AASHTO American Association of State Highway and Transportation Officials.

AREA American Railway Engineering Association.

IV. PORT AUTHORITY DESIGN CRITERIA

A. Design for earthquake in the City of Yonkers shall be as per Section 6.IV.A of this Manual.

B. In New Jersey, the minimum frost depth shall be three (3) feet.

V. PORT AUTHORITY STANDARDS

A. Single acting steam or air hammer shall be used for pile driving. Dynamic Pile Testing is recommended. Where other types of hammers are used, Dynamic Pile Testing shall be performed to substantiate the minimum transferred energy required.

B. The following P.A. Standard Specifications may be used for tenant projects.

1. Steel Pipe Piles.
2. Steel H Piles.
3. Timber Piles.
4. Monotube Piles.
5. Drilled Minipiles.
6. Pile Load Tests.
7. Dynamic Pile Testing.
8. Steel Sheeting Piling.
9. Caissons.
10. Aggregate Base Course.
11. Open Graded Aggregate Base Course.
12. Excavation, Backfill, and Fill.
13. Instrumentation for Settlement and Groundwater Observations.
14. Slurry Wall.
15. Soil Erosion and Sediment Control.
16. Dredging.

17. Dewatering.

18. Rock Excavation.

19. Prestressed Soil and Rock Anchors.

20. Rock Dowels.

21. Pressure Grouting.

VI. DETAILS OF GEOTECHNICAL REVIEW

The following are representative of items reviewed:

A. Required Reports:

1. Geotechnical Investigation Report, signed and sealed by the registered professional.

2. Verification - Stabilized Overburden.

3. Bearing Capacity of Nominally Unsatisfactory Bearing Material.

4. Alternate or Similitude Method for the Pile Load verification.

5. Substantiation of Higher Allowable Pile Loads.

6. Datum and ground water elevations.

B. Calculations and reports shall include, but not be limited to, the following:

1. Results of geotechnical site investigation, including test borings and laboratory tests; also, review of previous data obtained by the Port Authority or others

2. Estimates of settlement resulting from the proposed construction (structures, pavement, utilities) at the construction and adjacent sites.

3. Where it has been established that post-construction settlements of foundations be monitored, the monitoring program shall be submitted for review. Also, see Section 6, item V.A.16 of this Manual.

4. Stability calculations of earth slopes and embarkments, deep excavations, during and at the completion of construction.

5. Dewatering and seepage analysis and control.

6. Effects of construction operations on adjacent structures and underground utilities.

7. Earth and rock anchors.

8. Sand drains, surcharging, deep compaction and other methods that may affect adjacent properties.

9. Pile foundation requirements including pile type, pile capacity, downdrag load, minimum pile tip elevation, pile driving hammer type and minimum transferred energy.

10. Pile foundation investigation for seismic loading including foundation ties.

11. Seismic Liquefaction Analysis, where required. The analysis may be based on site specific response spectrum and acceleration time history, developed by the PA; instead of the criteria prescribed in AASHTO and the local building codes. The site specific data, if requested, will be made available to the tenant's consultant by the PA Engineering Quality Assurance Division.

12. Seismic Cyclic Loading and group action on pile foundation analysis.

SECTION 8

CIVIL

I. GENERAL

The scope of civil review shall comprise conformance with the applicable codes, standards, and other guidelines established in this section. The items to be reviewed will include proposed paving, sanitary sewer system, storm sewer system, gas utility, cold water domestic and fire prevention distribution system construction wherever they are placed on areas outside of the leasehold. Additionally, any proposed construction that connects to or impacts upon Port Authority utility systems or affects another Tenant, regardless of whether it is within the leasehold area, shall come under this review and shall conform to Port Authority standards and specifications.

Those portions of the sanitary and storm sewers that service or will service more than a Tenant's leasehold (or premises) are hereinafter referred to as "for common service" sections of the respective utility.

Port/Commerce facilities that are situated in environmentally sensitive areas, such as the Industrial Park at Elizabeth, are subject to more stringent design parameters and work in these areas shall conform to site-specific Port Authority standards and specifications. These special design standards include but are not limited to special utility design in order to eliminate the possibility of infiltration of groundwater.

II. CODES AND REGULATIONS

A. New York City:

1. Flood Control - New York City Building Code Subchapter 4, Article 10, and other Applicable Flood Control Regulations.

2. Applicable regulations of the New York City Environmental Protection Agency.

3. Barrier Free Design - New York City Building Code.

B. New Jersey:

1. New Jersey Administrative Code - Title 7, Environmental Protection Laws.

2. Applicable Flood Control Regulations.

3. Barrier Free Design - New Jersey Uniform Construction Code.

4. Applicable regulations of the local municipal water supply and sanitary sewer governing agencies.

C. City of Yonkers:

1. New York State Uniform Fire Prevention and Building Code.

2. Applicable Floor Control Regulations.

D. Federal:

1. Americans with Disabilities Act (ADA)

2. Applicable regulations of the U.S. Environmental Protection Agency.

3. FAA - AC150/5300-13 Airport Design.

4. FAA - AC150/5320-5B Airport Drainage.

5. FAA - AC150/5320-6D Airport Pavement Design and Evaluation.

III. STANDARDS AND PORT AUTHORITY DESIGN CRITERIA (See also Section 11)

A. General:

All site work outside the lease line shall conform to the appropriate

Port Authority Standard Details and Design Standards
See Attachments C1 and C2.

B. Paving:

1. General:

a. Pavement shall be designed using a recognized procedure approved by the Port Authority. The design procedure, design life, design vehicle(s) and design volume shall be submitted for review and approval.

b. Sidewalks outside of the lease line shall conform to P.A. Standard Detail Number 062.020 and Barrier Free Design.

2. Aviation Facilities:

a. Paving of taxiways or aprons to be constructed within Public Aircraft Facility (PAF) areas, or in areas to be used by more than one Tenant, shall conform to the latest PA Standard Details Number 062.001, 062.003 and 062.004 or the latest FAA Advisory Circular, whichever is thicker.

b. Paving within the airport's Tenant's lease line should be designed in accordance with the latest FAA Advisory Circular.

c. Erosion pavement or other alternate protective measures, such as a blast fence, shall be required wherever a blast form the aircraft may blow debris onto adjacent property. Erosion pavement shall be designed in accordance with FAA Advisory Circular AC 150/5300-13.

d. Roadway pavements outside of the lease line shall conform, as a minimum, to the P.A. Standard Details Number 062.001, 062.003 or 062.004 as applicable.

3. Port/Commerce Facility:

a. Paving of areas within the Tenant's lease line shall conform to P.A. Standard Detail Number 062.010 or shall be designed to withstand the heaviest anticipated container, container handling equipment or vehicular load.

b. Roadway pavements outside of the lease line shall conform, as a minimum, to P.A. Standard Detail Number 062.010.

C. Storm Sewer:

1. Aviation Facilities:

a. Surface drainage of airport aprons shall comply with the National Fire Protection Association (NFPA) Standard 415.

b. At the aircraft fueling ramps, drainage inlets shall be equipped with vapor trap hoods. The hoods shall provide a minimum of 12 inches of water seal.

c. Common service storm sewers shall be properly supported as per P.A. Standard Detail Number 041.001 or 066.001.

d. Common service storm sewer appurtenances and pipes shall be designed to withstand the heaviest anticipated aircraft or vehicle load. P.A. Standard Detail Numbers 010.010 and 020.013 shall be used wherever appropriate.

2. Port/Commerce Facilities;

a. Sewer appurtenances and pipes within the Tenant's lease line shall be designed to withstand the heaviest anticipated container, container handling equipment

or vehicular load. P.A. Standard Detail Numbers 010.014 and 020.021 shall be used wherever appropriate.

b. All storm sewers shall be properly supported as per P.A. Standard Detail Numbers 041.001 or 066.001.

D. Sanitary Sewers:

1. Aviation Facilities:

a. Common service sanitary sewer appurtenances and pipes shall be designed to withstand the heaviest anticipated aircraft or vehicular load. P.A. Standard Drawings shall be used wherever appropriate.

b. In New York City, whenever a city sanitary or combined sewer is within the P.A. facility boundary and affected in any way by a Tenant's proposed work, a note to the effect that "this work shall be coordinated with the appropriate City Department through a designated liaison person in the P.A.'s Chief Engineer's Office" shall appear on the contract drawings.

c. In New York City, whenever a proposed Tenant's sanitary sewer connection will be made to the City Sewer off P.A. property, the Tenant shall be required to apply directly to the appropriate City Department for approval and a note to that effect shall appear on the contract drawings.

2. Port/Commerce Facilities:

a. Sewer appurtenances and pipes within the Tenant's lease line shall be designed to withstand the heaviest anticipated container, container handling equipment or vehicular load. P.A. Standard Detail Number 010.014 shall be used wherever appropriate.

b. All sanitary sewers shall be properly supported as per P.A. Standard Detail Numbers 043.001 or 066.01.

c. In New York City, whenever a city sanitary or combined sewer is within the P.A. facility boundary and affected in any way by a Tenant's proposed work, a note to the effect that "this work shall be coordinated with the appropriate City Department through a designated liaison person in the P.A.'s Chief Engineer's Office" shall appear on the contract drawings.

d. In New York City, whenever a proposed Tenant's sanitary sewer connection will be made to the City Sewer off P.A. property, the Tenant shall be required to apply directly to the appropriate City Department for approval and a note to that effect shall appear on the contract drawings.

E. Cold Water Distribution Systems:

1. The cold water distribution system pipes and appurtenances are interconnected to the facility-wide cold water distribution systems and are for common service, and must conform to the requirements of the local municipal water authority. Port Authority Standards and Specifications are in compliance with these requirements and shall be utilized.

2. All cold water distribution system pipes and appurtenances shall be designed to withstand the heaviest anticipated aircraft, container, container handling equipment or vehicle load.

3. All cold water distribution system pipes shall have either a minimum cover of 4'-0", or be heat traced and insulated.

4. Pipe encasement(s) shall conform to the requirements indicated on Attachment C2.

5. Fire hydrants shall be spaced in accordance with the National Fire Protection Association Standards and Guides, and local municipality requirements, but in no case shall any part of a building's periphery be more than 300 feet from a hydrant.

6. Shut off valves shall be used at the point of connection wherever a proposed main is to be added to the existing distribution system.

7. All fire hydrants shall be connected to the supply main through a valved connection.

8. All curb and street valves shall be provided with a valve box meeting the requirements of the local municipal water authority.

9. All water distribution pipes and appurtenances shall be restrained against thrust forces.

F. Gas Utilities:

Gas service piping design and installation shall conform to the standards and requirements of the utility company whose jurisdiction covers the area in which the construction takes place. Verification of this conformance shall be submitted.

IV. DETAILS OF CIVIL REVIEW

The following are representative of details reviewed:

1. Design Computations:

a. Pavement: Procedure, service life, design vehicle and volume of traffic, structural Design.

b. Drainage: Hydrologic and hydraulic design.

c. Sanitary Sewers: Design flow and hydraulic design.

d. Water Supply: Design demands, residual pressure and hydraulic design.

e. Computations showing the structural capacity of existing utility service lines and appurtenances to support new loads, signed and sealed by the Professional Engineer licensed to practice in the State where the work is to be performed.

f. The PA Engineering Department shall be informed of the quantities of water demand and sewer load during the earliest stages of design.

2. Plans:

a. Location and plot plan with lease lines, showing all the coordinates.

b. All areas to be paved and pavement details.

c. All underground utility service lines (proposed and existing).

d. Details for all proposed utility service lines and appurtenances.

e. Whenever an existing utility service line is to be interrupted by specified work, a note requiring advance notification to facility operations personnel shall appear on the drawings.

SECTION 9

ELECTRICAL

I. GENERAL

The scope of the electrical review encompasses an examination of the design drawings, specifications, and computations, for compliance with the applicable Codes, Standards, and Port Authority Design Criteria.

II. CODES AND REGULATIONS

A. New York City:

1. New York City Electrical Code.
2. National Electrical Code.
3. New York City Building Code.
4. New York State Energy Conservation Construction Code.

B. New Jersey:

1. New Jersey Uniform Construction Code.
2. National Electrical Code.
3. BOCA National Building Code.
4. BOCA National Energy Conservation Code.
5. Illuminating Engineering Society Standard EMS-1, Lighting Power Budget Determination Procedure.

C. City of Yonkers:

1. New York State Uniform Fire Prevention and Building Code.

2. National Electrical Code.

D. Federal:

1. Federal Aviation Administration Advisory Circulars for Airports.

2. Americans with Disabilities Act (ADA).

III. STANDARDS

1. NFPA 20, Centrifugal Fire Pumps.

2 NFPA 409, Aircraft Hangars.

3. Factory Mutual Loss Prevention Data Sheet Number 5-4/14-8, Transformers.

IV. PORT AUTHORITY DESIGN CRITERIA

A. General:

1. Electrical power shall be purchased from the P.A. for tenancies in the New York Airports, the World Trade Center, and the Port Authority Bus Terminal. All metering wiring shall be shown on the drawings where power is purchased from the P.A.

2. High-tension (over 600 volts) switchgears, transformers, and splicing chambers, that are installed indoors, shall be installed in vaults.

3. Construction over existing duct banks and manholes shall be avoided. Existing duct banks which fall within the footprint of the structure shall be relocated prior to commencing construction. Manholes shall not be installed within the footprint of a structure.

4. Exploded-view drawings of electrical manholes in which the Tenant performs any work shall be submitted for review.

5. For fire detection and alarm requirements see Section 12 of this Manual.

6. For aircraft loading walkway requirements see Section 13 of this Manual.

7. For fire shutters in conveyor systems see Section 5 of this Manual.

8. PVC conduits and PVC insulation for wiring other than that for communications systems or remote control, signaling, or power limited circuits shall not be used above ground within buildings except as expressly permitted in this manual in specific applications.

B. High-Tension Power, New York Airports:

1. The incoming service shall be designed with a minimum of two (2) feeders, with automatic switch-over operation. The service shall be either:

   a) Primary Selective
   b) Secondary Selective
   c) Primary and Secondary Selective
   d) Spot Network

2. Primary selective switchgear shall be arranged with a mechanically interlocked tie switch to allow one feeder to supply the entire load.

3. Each incoming service switch shall be provided with a grounding switch, arranged to ground the incoming feeder (line side of switch). Interlocks shall be provided to prevent closing the grounding switch if the feeder is energized. The interrupting rating shall be 270MVA for JFK International Airport and 180MVA for LaGuardia Airport.

4. All incoming feeder cables shall be lead sheathed, EPR insulated (133% insulation level), copper conductor and polyethylene jacketed cable. Cables shall be manufactured by a factory approved by Con Edison. Splice kits shall be

approved by the P.A. The incoming service shall be provided with suitable metering compartments, with CT's, PT's, and meter pans provided by the P.A.

5. Transformers shall be dry type, vacuum pressure impregnated. For outdoor locations, transformers shall be cast coil construction (primary and secondary).

6. Shop drawings of switchgear shall be submitted for P.A. approval in advance of fabrication. Switchgear shall be inspected by the P.A. at the factory.

7. The Tenant's drawings shall include a complete one-line diagram showing all primary connections, switching and interlocks; power source, routing and feeder designations; size and type of feeder and conduit; KVA rating; types and voltages of all transformers; and all load data in justification of the amount of power requested.

8. Cable cuts and detailed drawings of high-tension splices shall be submitted.

9. P.A. specifications for the high-tension installation shall be used.

C. World Trade Center:

1. Conductors and Conduits:

   a. Minimum wire size for power shall be #12 AWG, copper.

   b. Minimum conduit size shall be 3/4-inch.

   c. Maximum EMT size shall be two (2) inches.

2. Afterset Fittings; Underfloor Cell Wiring:

   a. Each new or existing afterset fitting shall require two Palusol firestop packets, one on each side of the afterset baffle.

b. Floor outlets to be removed or abandoned shall have all wires removed back to the panel or header duct and the afterset fitting removed. The underfloor cell shall be capped with a metal slug and the hole filled flush with concrete cement.

3. Grounding; Ground-Fault Protection:

a. Wherever a grounding conductor is required (including feeders to motor loads greater than 1/8-horsepower), a separate ground wire shall be installed.

b. On raised floors, a #6 grounding wire shall be connected to every fourth pedestal of the floor system, and to the nearest building steel by means of a thermal type welded connection.

c. Ground-fault protection shall be provided for all receptacles and equipment located near running water, such as electrical water coolers.

4. Exit signs, exit lights, and fire alarm control panels and devices shall be connected to a source of emergency power. Note that a connection to the street side of the main panel is not possible in the World Trade Center. Emergency power may be taken from storage battery packs or connected to the building emergency power riser, if available.

5. PVC insulation is permitted for elevator traveling cables operating at 120 volts.

6. PVC wire insulation is permitted in 7 WTC.

D. Port Authority Bus Terminal: See Attachment E1.

E. Ports Department: PVC wire insulation is permitted in warehouses and prewired temporary office trailers.

V. DETAILS OF ELECTRICAL REVIEW

The following are representative of items reviewed:

1. Existing code violations in areas affected by the work.

2. The power distribution system (feeders, switchgear, transformers, panels and overcurrent protective devices), including coordination of plans regarding connections and available capacities with P.A. utilities. A one-line diagram giving source identification, conductor types and sizes, connected and demand loads, basis of source capacity, voltage drop, and adequacy of overcurrent protection shall be presented. Characteristics of special loads, e.g., large motor loads, shall be detailed. Key- and mechanical- interlocks shall be shown, identifying operational procedures for energizing, deenergizing and grounding of high-tension equipment.

3. Obstruction, envelopment or elimination of electrical ducts, vaults, manholes, and handholes by new construction.

4. All materials and apparatus shall have been tested and approved for the proposed use by the agency or testing laboratory recognized in the relevant jurisdication. See Section 14 of this Manual.

5. Coordination with other trades such as:

a.	Architectural:	Place of assembly lighting; electric door locks; exit signs; egress lighting; fire stopping.
b.	Structural:	Suspension of lighting fixtures; weight of storage batteries.
c.	Mechanical:	Ventilation and cooling of electrical rooms;diffusion of battery gases.
d.	Environmental:	PCB removal.

6. Wiring methods (conductors and raceways).

7. Grounding, including system grounding of derived systems such as transformers and generators.

8. Communications wiring with regard to radiation, electromagnetic interference, electrical safety, and fire hazards.

9. Signal wiring and emergency power for fire alarm and detection systems.

10. Emergency power for lighting, exit lights and signs, and opening protectives.

11. Computer room disconnecting means for electronic and HVAC equipment.

12. Code limitations on plastic light diffusers and Port Authority standard for plastic signs.

13. Alarm, detection, and visible and audible alerting devices. See Section 12 of this Manual.

14. Physical safety, such as clearances around equipment, and exit provisions from within electric rooms.

15. Telephone installation shall not have any components in common with the power or lighting installation.

16. The coordination of fire detection and fire suppression provisions with designs for open wiring such as in computer rooms and raised floors. For guidance, see the New York City Electrical Code, Bulletin Number 126, revised 1983, and NEC Article 645.

17. Transformers and capacitors that are PCB-contaminated or PCB-filled shall be identified.

    Any operation, including repairs, that can possibly cause PCB to spill, must be coordinated with the Facility Manager.

    The Tenants shall comply with the requirements of:

    a. Toxic Substance Control Act (Federal).

    b. Regulations of federal, state, and local environmental protection agencies.

18. The support of all equipment shall comply with the provisions of *Section 6 of this Manual.*

19. Energy conservation.

SECTION 10

MECHANICAL

I. GENERAL

The scope of the mechanical review will be for compliance with the codes and standards listed below, and will include the installation and alteration of service equipment and systems.

The following is a representative list of systems reviewed:

Heating, ventilating, air conditioning, and refrigeration.

Smoke control and purge systems.

Fire suppression systems and controls.

Handling and storage of gases or fluids that are volatile, combustible, flammable, toxic or corrosive.

Pressure vessels, fired and unfired.

Industrial processes. Bulk storage and distribution of fuel and gases (glycol, LPG, LNG, etc.)

Airport fuel distribution systems.

Energy conservation.

Battery charging spaces.

Aircraft loading walkways.

Water recovery processes.

Waste treatment equipment.

Control of methane under buildings.

Cargo handling equipment (ETV, etc.)

II. CODES AND REGULATIONS

A. New York City:

1. New York City Building Code.

2. The Reference Standards of the above, such as those for Elevators, Conveyors, ASHRAE, SMACNA, NFPA, etc.

3. New York City Fire Prevention Code.

4. New York State Energy Conservation Code.

5. New York State Department of Environmental Conservation Regulations and Federal Clean Air Act.

6. Rules of the City of New York, Title 1, Department of Buildings.

7. New York City and National Electrical Codes.

B. New Jersey:

1. The New Jersey Uniform Construction Code (NJUCC), its bulletins and subcodes (BOCA Building, Mechanical, Fire Prevention, etc.) with their Supplements and Reference Standards.

2. National Standard Plumbing Code as amended by NJUCC.

3. BOCA Basic Energy Conservation Code as amended by NJUCC.

4. Illuminating Engineers Society Standards, EMS-1.

5. National Electrical Code.

6. Rules, New Jersey Bureau of Air Pollution Control (Certification) and Federal Clean Air Act.

7. NJAC - Title 7 - Environmental Protection Laws.

C. City of Yonkers:

1. Prior to 6/2/89: The Codes of the City of Yonkers.

2. After 6/2/89: New York State Uniform Fire Prevention and Building Code.

III. STANDARDS

A. ASME: Boiler and Pressure Vessel Code.

B. ANSI: Pressure Piping Codes.
B-30.13d Storage/Retrieval (S/R) Machines and Associated Equipment

B-31.1 Power Piping.

B-31.3 Petroleum and Chemical Plant Refinery Piping.

B-31.4 Liquid Petroleum Transportation Piping Systems.

B-31.9 Building Service Piping.

C. API (American Petroleum Institute):

1. 5L Steel Line Pipe.

2. 600 Series For Pumps, Valves, etc.

3. 1104 Welding.

D. National Fire Protection Association (NFPA) standards:

1. NFPA 30, Flammable and Combustible Liquids Code.

2. NFPA 407, Aircraft Fuel Servicing (Fueling systems).

3. NFPA 416, Airport Terminal Buildings.

4. NFPA 417, Aircraft Loading Walkways.

5. NFPA 54, National Fuel Gas Code.

E. CGA (Compressed Gas Association): Compressed Gas Handbook.

F. ASHRAE (American Society of heating, Refrigerating and Air-Conditioning Engineers, Inc.) Standards.

G. Petroleum Equipment Institute - Recommended Practices for Installation of Underground Liquid Storage Systems.

IV. PORT AUTHORITY DESIGN CRITERIA

A. Airports:

Aircraft Fueling Service:

1. Work affecting the airport fuel distribution system shall be coordinated with the existing airport system for compatibility, surge pressure safety, and system design check. Depending on the nature of the modification, surge pressure calculations may be required.

2. All automatic control valves shall be performance tested in compliance with the P.A. Engineering Department's initial contract requirements for the airport fuel systems.

3. Valving at fuel storage tank connections and at truck loading racks, beneath surge suppressors or hydrant valves shall be constructed with supplemental fire rated safety stop valves. These safety stop valves shall be closed by fusible link action upon exposure to fire, and shall conform to UL or API Fire Tested Valve Safety Standards.

4. For the protection of building walls around pressure surge suppressors see Section 5-IV.B.1.d of this manual.

5. For the protection of the ramp drainage inlets see Section 8.III.C of this manual.

B. Bus Terminal: See Attachment for HVAC Design Criteria.

C. World Trade Center: See the published W.T.C. guidelines for HVAC and Fire Safety systems.

D. General:

1. PVC piping shall not be used above ground within buildings.

2. All new escalators in New Jersey shall have a comb plate impact device with a vertical element setting of 45 pounds for escalator width up to 32 inches and 60 pounds for escalators wider than 32 inches and a horizontal setting of 112 pounds at either side or 225 pounds at center plate. Also, all new escalators in New York and New Jersey shall have the trailing wheels within the width of the steps or shall have two undercarriage rail type supports for the full length of the escalator.

V. DETAILS OF MECHANICAL REVIEW

The following are representative of items reviewed:

A. The review shall extend to existing code violations in areas affected by the work.

B. In reviewing a proposed project, particular attention shall be given to:

1. General system design.

2. Coordination of all new work with existing conditions.

3. Review of materials, operating and safety controls, equipment approval.

4. Requirements for system and equipment testing and inspection.

C. Work affecting the Aviation Fuel Servicing systems and Central Heating and Refrigerating Systems, including additional load

requirements, piping and metering, shall be coordinated with the chief Mechanical Engineer.

D. Special attention shall be directed to the following items:

1. A complete schedule of symbols and abbreviations used on the drawings shall be provided.

2. HVAC:

   a. Shaft requirements for air ducts.

   b. Fire/smoke dampers at ducts through rated partitions and floors.

   c. Installation details for fire dampers to stay in place if a duct is disrupted. (See SMACNA Fire Damper Guide). For world Trade Center see W.T.C. Standard Details. Access doors shall be accessible.

   d. Smoke detectors and fire/smoke dampers at ducts entering "Safe Areas," exit passageways, and lobbies.

   e. Fire detector and smoke detector requirements for fan systems to shut fans and smoke dampers automatically and transmit signal.

   f. Fire resistive insulation materials.

   g. Air filters in ventilating systems (Class 1 or Class 2 with fire protection systems, if required).

   h. Ventilation Index Schedule.

   i. Smoke control systems.

3. Commercial type cooking/equipment: Grease ducts, extractors, dampers, insulation, fixed pipe fire extinguishing systems in hoods and ducts.

4. Noise and vibration control.

5. Energy Conservation: Building envelope analysis, design criteria, and thermal performance of component systems.

6. Bulk storage of liquids and gases: Tanks, piping, supports, anchorage, clearances, electrical grounding, Fire Department regulations, and leak detection.

7. Battery Charging Spaces:

   a. Spaces dedicated to such use shall be classified as D-2 and F-2 occupancies in the New York City Building code and BOCA, respectively.

   b. The components of the charging system and their compatibility shall be approved in New York City by an agency such as the Board of Standards and Appeals (BS&A), the MEA, or the Advisory Board of the Bureau of Electrical Control (Department of Buildings); in New Jersey, see BOCA Mechanical Code Chapter 4, as amended by New Jersey Uniform Construction Code, for approval requirement.

   c. An adequate ventilation (exhaust) system shall be designed to prevent the accumulation of an explosive mixture of gases in the battery room under the worst conditions of battery and/or charger failure.

   d. Also, see the National Electrical Code, Section 480-8 and New York City Electrical Code, Section B30-143.0.

8. The support of all equipment shall comply with the provisions of Section 6 of this Manual.

SECTION 11

PLUMBING

I. GENERAL

The scope of the plumbing review shall include the installation of and alteration to the following systems, in accordance with the applicable codes and standards:

Water supply and distribution.

Sanitary and storm drainage and disposal.

Industrial wastes.

Sprinklers.

Fire standpipes.

Gas piping.

II. CODES AND REGULATIONS

A. New York City:

1. New York City Building Code and its Reference Standards.
2. New York City Fire Prevention Code.
3. Rules of the City of New York, Title 1, Department of Buildings.
4. New York State Energy Conservation Construction Code.

B. New Jersey:

1. The New Jersey Uniform Construction Code (NJUCC).

2. The National Standard Plumbing Code as amended by NJUCC.

3. BOCA National Building Code.

4. BOCA National Mechanical Code, as amended by NJUCC, where applicable (gas piping, etc.).

5. BOCA National Fire Prevention Code.

6. BOCA National Energy Conservation Code as amended by NJUCC.

7. The Supplements and Reference Standards of the Codes.

C. City of Yonkers:

1. Prior to 6/2/89: The Codes of the City of Yonkers.

2. After 6/2/89: New York State Uniform Fire Prevention and Building Code.

III. STANDARDS

A. See Sections 8 and 12 of this Manual.

B. National Sanitation Foundation approval for Kitchen equipment.

IV. PORT AUTHORITY DESIGN CRITERIA

A. General:

1. PVC piping shall not be used above ground within buildings.

2. Fire standpipe hose shall be approved 100% - synthetic single jacket fire hose.

3. Clamps for no-hub piping shall be those manufactured by Clamp-all Corp, Huskey SD series 4000 or approved equal.

4. All hubless pipes shall be anchored at each side of hub and at five (5) foot intervals.

5. In demolition work, unused piping shall not be abandoned in place. Piping shall be removed back to source or point of discharge, and the resulting openings plugged. Such work shall be shown on the drawings.

B. Airports:

Oil separator effluents shall be discharged into the sanitary sewer system.

C. World Trade Center:

Plumbing and Fire Protection work shall conform to the Tenant Plumbing/Fire Protection Design Guidelines for the World Trade Center.

V. DETAILS OF PLUMBING REVIEW

The following are representative of items reviewed:

1. Drawings shall show a complete layout and riser diagrams.

2. Existing conditions and systems shall be shown in sufficient detail to enable the review of proposed alterations.

3. Specifications for materials, equipment, fixtures, insulation, installation, procedures, etc.

4. The review shall extend to existing code violations in areas affected by the work.

5. Areas of work shall be clearly identified with column numbers and occupancy identification.

6. The support of all equipment shall comply with the provisions of Section 6 of this Manual.

7. The following is a partial list of items to be shown in the design documents:

   a. Plumbing:

      i) Floor plans showing the location, layout and spacing of all plumbing fixtures, the summation of plumbing loads, the size, location, and material for all building sewers and drains, and the soil, waste, vent, water, and gas distribution piping.

      ii) Riser diagrams showing:

         1. Story heights.

         2. All plumbing fixtures with diagrammatic arrangement of their connections to soil, waste, and vent piping.

         3. All soil, waste, and vent stacks from the point of connection with the building drain to their termination above the roof.

         4. All leader and storm water piping from the point of connection with the building drain to the roof drain.

         5. All water and gas risers.

      iii) All appurtenant equipment, including, but not limited to, pumps, ejectors, waste tanks, backflow preventers and piping shall be indicated clearly on the plans.

b. Fire Standpipe:

i) Floor plans showing the location and size of all risers, cross-connections, hose racks, valves, siamese connections, source of water supply, piping, and other essential features of the system.

ii) Riser diagrams showing the essential features of the system and indicating the risers, cross-connections, valves, siamese connections, tanks, pumps, sources of water supply, pipe size, capacities, floor heights, zone pressures, and other essential data and features of the system.

iii) The available water pressure at the top and bottom floors of each zone, and at each floor where the weight of pipe fittings change, shall be shown on the riser diagram.

c. Sprinkler/Fire Protection System:

i) The location and size of water supplies and the location, spacing, number, and type of sprinklers to be used, with approximate location and size of all feed mains, risers, valves, siamese connections, and other essential features of the system.

ii) A diagram showing the proposed sprinkler system in relation to principal construction features of the building, such as its size, walls, columns, and partitions, and such other information as may be necessary for the evaluation of the system.

iii) The location, number, and type of any electrical or automatic devices to be used in the system.

iv) The available water pressure at the top and bottom floors of each zone shall be shown on the riser diagram.

v) Hydraulic calculations with all pertinent information as required by NFPA 13.

vi) Other fire suppression systems. Plans for chemical or gaseous fire suppression piping systems shall contain the type of extinguishing agent and number and size of agent containers; size, length, and type of all piping that will be used; number and location of all fusible links or detectors and the temperature setting.

SECTION 12

FIRE PROTECTION

I. GENERAL

The scope of the review shall include the design of various fire detection, alarm, and suppression systems.

II. CODES, REGULATIONS, AND STANDARDS

Fire Protection is an integral part of several disciplines contained in all building, mechanical, electrical, and fire protection codes.

See the Architectural, Electrical, Mechanical, and Plumbing Sections of this Manual for the applicable codes, regulations and standards.

The National Fire Protection Association (NFPA) Standards will be used in areas not covered by codes.

III. PORT AUTHORITY DESIGN CRITERIA

A. Concealed conveyor spaces inaccessible to firefighting equipment shall be provided with a sprinkler system. Spaces over all types of ceilings are considered inaccessible.

B. Fire Alarms:

1. General:

a. *Municipal fire alarm boxes shall be furnished and* installed in conformance with the regulations of the Fire Department of the municipality in which the work will occur. These regulations shall control the type of devices to be used.

See Attachment F1 for New York City Municipal Fire Alarm at LGA and JFK.

b. Proprietary and central station alarm systems in the P.A. facilities, where provided, shall be compatible with the existing systems. When new systems or complete systems upgrading are provided in a building or complex within a P.A. facility, a Point Addressable Programmable System capable of interfacing with the facility central station shall be used. The system shall clearly identify the type of alarm, the exact location of origin within the building, and the status of the system and the device.

c. All fire alarm station signals shall be transmitted to a central station via leased telephone lines (Police Emergency Garage or other designated location). At LaGuardia Airport, fiberoptic cable is used to carry signals from each building to the Police Emergency Garage. At the World Trade Center, fire alarm transmission lines are installed under Port Authority control.

d. Manual fire alarm activation, sprinkler water flow activation, and heat and smoke detector activation, shall activate the audible and visual alarms at facility -designated locations within buildings, and also send an appropriate signal to the central station. This signal shall identify the location within the building and indicate the type of alarm originating device and status. Each originating device shall provide a distinct signal, unlike that of any other device.

2. World Trade Center:

a. Wiring

i. General - All fire alarm cables shall be type FPLP-UL, twisted pair #14 AWG, solid copper, 200°C, 600V, shielded (or unshielded as required for speaker circuits), insulated conductors, Class E, BS&A or MEA approved with FEP Teflon, and conductors colored black and red. All wiring, raceways, fittings,

connectors and enclosures shall be UL Listed for the intended use.

ii. Initiating Device Circuits (Smoke & Heat Detectors, System Interfaces, Pull Stations) shall be #14 AWG, Solid Twisted Pair Shielded fire alarm cable.

iii. Notification Appliance Circuits:

a. Conventional Signals (Bells, Horns, Strobes) shall be #14 AWG, Solid Twisted Pair, Shielded fire alarm cable.

b. Paging Signals (Speakers) shall be #14 AWG, Solid Twisted Pair, Unshielded fire alarm cable.

iv. Control Circuits:

All Control circuits shall be #14 AWG, Solid Twisted Pair, Unshielded fire alarm cable.

v. Power Supply:

1. 120VAC Fire Alarm Power Supply Circuits shall be minimum #10 AWG, XHHW-2, 600V, 90°C.

2. 12/24 VDC Fire Alarm Battery Power Supply Circuits, where not provided as part of the manufacturer's assembly, shall be minimum #10 AWG, XHHW-2, 600V, 90°C, as used typically in remote battery cabinet applications.

b. System:

i. All components connected to the WTC Base Building Fire Alarm System shall be fully compatible with the Base System. UL/MEA Listings, Cross Listings and Manufacturers approval shall be required.

ii. All field circuits, Initiating and Notification, shall originate from the Floor TSC (terminal strip cabinet) and additional circuits shall be made as a continuation of the existing run as directed by the World Trade Center Plant and Structures group.

iii. All relay control circuits will be operated via an addressable interface module (designated TRI-60R/ TRI-B6R), which can be installed anywhere along the ALD circuit. No relay outputs may be obtained from either the TSC or MXLRV System Transponder.

iv. All Conventional Inputs (Waterflow, Tamper, Alarm and Trouble from tenant panels) shall be made to the system via an addressable interface module (designated TRI-60D/TRI-B6D), which can be installed anywhere along the ALD circuit. No conventional inputs may be obtained from either the TSC or MXLRV System Transponder.

3. P.A. Bus Terminal:

See Attachments M1 and E1 for smoke and fire detection requirements.

4. Airports:

At Airport Passenger Terminal buildings, an interior manual fire alarm station and audible and visual alarm devices shall be located at the point of connection between the building and an aircraft Loading Walkway.

IV. DETAILS OF FIRE PROTECTION REVIEW

The following are representative of items reviewed:

1. Sprinkler and other systems using dry chemicals, foams, gaseous, and other extinguishing agents shall be shown on drawings, signed and sealed by he Architect or Engineer of record, or if prepared by a specialized consultant, signed and sealed by such licensed

consultant. Said consultants must be licensed to practice in the State in which the work will be performed.

2. Sprinkler plans shall indicate or list the appropriate information and data specified in NFPA Standard 13 regarding available water sources, supply pressure, number and type of sprinklers, fire department connections, hazard classification, alarm devices, and supervisory connections. Hydraulic computations shall be submitted when used.

3. A complete Fire Alarm riser diagram showing locations of all stations, visible and audible alerting devices, control panels, and wiring shall be provided.

SECTION 13

PROTECTION FROM AIRPORT RAMPSIDE FUEL SPILL FIRE

I. GENERAL

The following are minimum guidelines for the design of protective measures to reduce the hazard of a rampside fuel fire.

II. CODES AND REGULATIONS

Building codes, where applicable, shall serve as minimum design criteria.

III. STANDARDS

The National Fire Protection Association (NFPA) standards shall be used, where applicable. The following are representative NFPA standards to be used in conjunction with P.A. design criteria (see paragraph IV):

A. Terminal Buildings, Satellites, Fingers, etc.:

1. NFPA 407, Aircraft Fuel Servicing - Proximity of vent and fill points to air intake points on the building and the proximity of the building to fueling hydrants, cabinets, and pits.

2. NFPA 415, Aircraft Fueling Ramp Drainage - Proximity of drainage points to structures, and ramp gradients.

3. NFPA 416, Airport Passenger Terminal Buildings:

   a. Special provisions for below-grade area to be protected from fuel and vapor penetration.

   b. Distance and protection of heating and ventilation openings on the building, and openings to certain mechanical rooms, from points of potential fuel or vapor release.

c. Exit doors discharging onto ramps shall be marked "EMERGENCY EXIT ONLY."

d. Protection of window glass when potential fuel spill points are within 100 feet (also, see paragraph IV. A.1).

B. NFPA 417, Aircraft Loading Walkways.

IV. PORT AUTHORITY DESIGN CRITERIA (See Attachment RFS-1)

A. Terminal Buildings, Satellites, and Fingers:

A fire geometry with a 25 foot radius (as observed from NAFEC tests) shall be considered around points of potential fuel spillage (ppfs) such as fueling hydrants, catch basins, fuel tank fill connections, etc. The exterior walls of the building shall be protected as follows:

1. *There will be no ppfs within 50 feet of the buiding.*

   Exception: Aircrafts may be positioned with a minimum distance of 25 feet from the building to the aircraft fuel system vents or fuel tank openings provided that there are no combustion and ventilation air-intake to any boiler, heater, or incinerator room within 50 feet of the vent or tank openings.

2. When the ppfs is 50 to 85 feet, the building shall be protected as required by the local Building Code, based on the "exterior fire sepration."

3. Large areas of window glass, covering more than 50% of a wall, which has a distance of less than 100 feet from a ppfs, shall be protected by means of an automatic system of water curtain or fire shutters activated by an appropriate fire detection system.

Note: In determining the above percentages, only that portion of the wall not backed by the building's structural components should be included. Also, the distance from the ppfs shall be measured to the center of the wall - in its plan view.

4. Exit doors or exit stairs opening onto the apron within 85 feet of potential points of fuel spillage must be protected by a full height radiation barrier.

B. Aircraft Loading Walkways:

1. The design shall provide a safe exit route from the aircraft for a period of at least five (5) minutes under severe fire exposure conditions, equivalent to a free-burning jet fuel spill fire, in compliance with NFPA 417, Aircraft Loading Walkways. The engineer-of-record shall certify compliance in writing and submit the test reports and computations as defined in NFPA 417 to demonstrate compliance.

2. Loading Walkways shall be designed to prevent sudden failure (collapse, explosion, or development of excessive smoke and gases) during the ten (10) minute test.

3, Walkways shall comply with the following:

a. A maximum travel length of 150 feet. Portions exceeding 150 feet shall be designed as part of the terminal building.

b. A minimum width of 44 inches or the width of the aircraft door being served, whichever is larger.

c. A maximum slope of 1:10.

d. Class A interior finish and floor coverings.

e. Non-slip floor covering.

f. Emergency lighting.

g. Light diffusers of plastic material shall be of an approved type for exits, or wired glass shall be used.

4. Compliance shall include:

a. Structural integrity of the walkway under the fire conditions. For structural criteria see Section 6 of this Manual.

b. Structural columns, as principal structural parts, shall also be designed with the capacity to endure the fire test.

c. Interior atmosphere (toxic products of decomposition and/or dense smoke resulting from fire), and the maximum temperature of 248°F.

d. Component durability.

e. Integrity of closure curtain with respect to smoke penetration through cracks and openings shall be established.

5. Windows shall not be allowed, except the minimum required by the operator, which shall be protected by wired glass or an automatic fire shutter.

6. The door opening into the walkway shall have an electrical interlock to prevent opening until the walkway is engaged with the aircraft.

7. The aircraft loading walkway shall not be located over any drainage outlets. See NFPA 415.

8. The electrical installation shall comply with the (stricter) applicable requirements of the National Electrical Code and the local Electrical Code, particularly with the Hazard Requirements; i.e., presence of flammable vapors from aircraft fueling, venting, and storage points.

9. The hydraulic and electrical system for the walkway shall be demonstrated to be fail-safe.

SECTION 14

MATERIALS, OPERATIONS, AND EQUIPMENT APPROVAL AND INSPECTION

I. GENERAL

The purpose of this section is to outline:

A. The requirements for acceptance (approval) of materials, assemblies, forms, methods of construction, and the intended use of equipment.

B. The requirements for inspection of materials, assemblies, and construction.

II CODES AND REGULATIONS

See the Technical Sections of this Manual

III. NEW YORK CITY

A. Approval/Acceptance of Materials, Equipment, etc.:

No material, assemblies, forms, method of construction, equipment, machinery, and devices will be acceptable for the intended use unless:

1. Accepted by the Code test method by the Materials and Equipment Acceptance (MEA) Division of the New York City Department of Buildings.

2. Or, previously approved by the New York City Board of Standards and Appeals (BS&A).

MEA or BS&A resolutions of approval shall be submitted for review along with other review documents. Manufacturers' or distributors' letters are not acceptable. The above requirements are abstracted from New York City Building Code, Sections 27-130, 27-131, 27-134, and 27-135.

B. Inspection:

Controlled Inspection (Code Sections 27-132 and 27-136)

1. All materials, equipment, and construction designated by the Code for "controlled inspection" shall be inspected and/or tested to verify compliance with the Code.

2. Controlled inspection shall be made and witnessed by or under the direct supervision of a registered architect (RA) or professional engineer (PE), retained by the tenant and acceptable to the architect or engineer responsible for the plans. The inspecting RA or PE shall be independent of the contractor.

3. All items subject to controlled inspection shall be listed on the title sheet of the plans, or the sheet immediately following.

The following list contains items subject to controlled inspections, as well as the items' relevant Code sections, where applicable. Effort has been made to make this list as inclusive as possible. Other items subject to controlled inspection, as required by NYC Building Code, that have been omitted in this list must also comply.

Borings or test pits	27-720
Piles	27-721
Subgrade for foundation	27-723
Controlled fill	27-679(a)
Underpinning	27-724
Concrete	Code Tables 10-1, 10.2
Formwork	27-1035(b)

Steel:	
i. Welding	Code Table 10.2
ii. H.S. bolts	Code Table 10-2
iii. Cable fittings	Code Table 10-2
Aluminum, welding	Code Table 10-2
Laminated wood	Code Table 10-2
Masonry	Code Table 10-2
Exterior Wall Insulation and Finish Systems	27-335.1(c)13
Firestopping	27-345(h)
Spray-on fireproofing	27-324(f)
Heating and combustion ..... equipment	27-793(a), 27-794(b)
Ventilation systems	27-779, 27-780
Refrigeration systems	27-781
High pressure systems	Department of Buildings, Rules Section 20-02(b)(2)(i)
Chimney smoke vent	27-856(e), 27-879(b)
Welding of gas distribution piping	RS-16, P115.8(h)
Curtain/Panel Wall	Rules of the City of New York, Title 1, Department of Buildings, Chapter 32.

Structural integrity during ..... construction operations	Rules of the City of New York, Title 1, Department of Buildings, Rules, Chapter 16.

IV. NEW JERSEY

A. Approval/Acceptance of materials, Equipment, etc.:

1. Acceptance of materials, assemblies, equipment, forms, methods of construction, etc., shall be based on certified test reports from approved agencies. See BOCA Building Code Chapter 17 and BOCA Mechanical Code Chapter 4, as amended by New Jersey Uniform Construction Code (NJUCC).

   Note: Approvals from the New York City Material and Equipment Acceptance (MEA) Division are acceptable. See Paragraph III.A.1.

2. See NJUCC, Section 5:23-4.26 for certification of building elements, such as trusses, fire walls, fire separation walls, wall panels, pre-stressed/prefabricated floor or roof panels and pre-engineered structural frames.

B. Inspection:

Construction Control - as per NJUCC Section 5:23-2.21(e):

1. The tenant shall assign a "responsible person in charge of the work" (RPIC), who shall be responsible for:

   a. Review and approval of all documents pertaining to the construction phase.

   b. Verification of all controlled materials.

   c. Special inspection of critical construction components (see list in paragraph 2 below).

d. Necessary services to determine that the work is proceeding according to the approved documents.

e. At the completion of work, the RPIC shall submit a report to the P.A. attesting to the satisfactory completion of the project, including a list of deviations from the approved documents.

2. All items subject to "special inspection," stated in item B.1.c, shall be listed on the title sheet of the plans, or the sheet immediately following.

The following is a list of items subject to "special inspection of critical construction components." Effort has been made to make this list as inclusive as possible based on the current codes adopted by the NJUCC. Other construction items subject to "special inspection" as required by these codes that have been omitted in this list must also comply:

a. Inspection of Fabricators ..... BOCA, Section 1705.2 as amended by NJUCC.

b. Steel Construction:

i. Material Receiving ..... BOCA, Section 1705.3.2.

ii. Erection:
Installation of High strength bolts..... BOCA, Section 1705.3.3.1.

Welding ..... BOCA, Section 1705.3.3.2.

Details ..... BOCA, Section 1705.3.3.3.

c. Concrete Construction:

i.	Materials	BOCA, Section 1705.4.1
ii.	Installation of Reinforcing and Prestressing Steel	BOCA, Section 1705.4.2.
iii.	Formwork	BOCA, Section 1705.4.3.
iv.	Concreting Operations...	BOCA, Section 1705.4.4.
v.	Inspection during Prestressing	BOCA, Section 1705.4.5.
vi.	Manufacturer of Precast Concrete	BOCA Section 1705.4.6.
vii.	Erection of Precast Concrete	.BOCA Section 1705.4.7.

d. Masonry Construction ..... BOCA, Section 1705.5.

e. Wood Construction ..... BOCA, Section 1705.6

f. Foundations:

Prepared fill	BOCA, Section 1705.7
Pile foundations	BOCA, Section 1705.8

	Pier foundations	BOCA, Section 1705.9
g.	Wall panels and veneers	BOCA, Section 1705.10
h.	Sprayed fire resistive materials	BOCA, Section 1705.12
i.	Exterior insulation and finish systems	BOCA, Section 1705.13.
j.	Special Cases	BOCA, Section 1705.14

SECTION 15

ENVIRONMENTAL

I. GENERAL

The scope of environmental review shall include asbestos management, soil and water sampling and analyses, soil and waste excavation - use or disposal, and underground storage tank installation, testing, repair or removal. Documents will be reviewed for compliance with applicable codes, regulations and standards. Reports on the results of environmental investigations and analytical results shall be submitted to the Port Authority.

II. CODES AND REGULATIONS

A. Federal:

The following federal laws and the corresponding state laws and regulations are applicable:

1. Clean Air Act.
2. Clean Water Act, including Underground Storage Tank and Spill Regulations.
3. Federal Insecticide, Fungicide, and Rodenticide Act.
4. Noise Control Act.
5. Occupational Safety and health Act.
6. Resource Conservation and Recovery Act.
7. Toxic Substances Control Act.

B. New York City:

1. Administrative Code of the City of New York.

2. Asbestos Control Program.

3. Department of Sanitation Codes.

C. New Jersey:

1. New Jersey Administrative Code.

2. Industrial Site Recovery Act (ISRA).

D. City of Yonkers:

New York State Uniform Fire Prevention and Building Code.

III. STANDARDS

1. Port Authority Standard Specifications for Asbestos Removal.

2. National File Protection Association.

3. American Petroleum Institute Guidelines.

IV. DETAILS OF ENVIRONMENTAL REVIEW

The following are representative of items reviewed:

A. Asbestos Management:

1. Work procedures and staging.

2. Dimensions, plans, and isolation barriers.

3. Decontamination system.

4. Ventilation and air control systems.

5. Documentation.

B. Soil/Water sampling, analyses, use, disposal:

1. Location and depth of samples.

2. Test parameters.

3. Soil/Water disposal methods.

4. Documentation.

C. Underground Storage Tanks:

1. New tank installation.

2. Results of tank tests and monitoring.

3. Tank removal or abandonment.

4. Tank repair.

5. Documentation.

SECTION 16

CORROSION CONTROL/CATHODIC PROTECTION

I. GENERAL

The scope of the corrosion control/cathodic protection review includes an examination of the of the cathodic protection, coatings and other related systems design drawings, specifications, and computations for all metallic structures exposed to underground, marine, or atmospheric environment in regard to their compliance with the codes, standards, and Port Authority Criteria.

II. CODES, STANDARDS AND REGULATIONS

A. Federal:

1. Environmental Protection Agency: 40 CRF Parts 280 and 281.

2. Department of Transportation: Title 49, Parts 191, 192, 193 and 195.

B New York:

New York State Department of Environmental Conservation: 6NYCRR Parts 612, 613, 614.

C. New Jersey:

New Jersey Department of Environmental Protection: Subchapter 4.

III. STANDARDS

1. NACE International Standards: RP 0169, RP 0285.

2. ASTM Standards: G3, G4, G5, G51, G57, G97, and G102.

IV. PORT AUTHORITY CRITERIA

A. The design of all Corrosion Control/Cathodic Protection Systems shall be performed by a NACE certified Corrosion Specialist.

B. The cathodic protection systems shall be compatible with the existing systems at the PA facility.

C. In New York, all cathodic protection systems shall be registered with the "Greater New York Corrosion Committee" and in New Jersey, all cathodic protection systems shall be registered with the "New Jersey Corrosion Committee.

D. All cathodic protection systems shall be started-up by a NACE certified Corrosion Specialist. A report documenting the final setting shall be prepared and submitted to the Port Authority.

ATTACHMENT A1

STANDARD FOR INTERIOR PLASTIC SIGNS

1.0 General: The provisions of this specification shall govern the design and use of interior plastic signs and panels in both New York & New Jersey.

2.0 Definitions, symbols and notations: The following definitions, symbols and notations shall apply to the provisions of this standard (units in parenthesis are for the variable described):

A_s (ft^2) =	Allowable sign facing area
L (ft) =	The length along the ceiling of a ceiling sign
P_w (ft) =	Minimum distance between an egress path and a sign. Distance can be passage width or height
t (inches) =	Thickness of sign facing material(s)
V_c (ft^3) =	Volume of space or room in which the sign is located

Ceiling sign: A ceiling mounted sign with its top located within one foot of the ceiling and its bottom located five feet or higher above the floor.

Interior plastic sign: A sign, located within a structure, which has a facing which is constructed of plastic.

Multiple-faced sign: A sign with more than one exposed face.

Sign: Any fabricated sign or display structure, including its structure, consisting of any letter, figure, character, mark, point, plane, marquee sign, design, poster, pictorial, picture, stroke, stripe, line, trademark, reading matter or illuminating device, which is constructed, attached, erected, fastened or manufactured in any manner whatsoever so that the same shall be used for the attraction of the public to any place, subject, person, firm, corporation, public performance, article, machine or merchandise whatsoever, and displayed in any manner for recognized advertising purposes.

Sign facing: The display portion of a sign.

Single-faced sign: A sign with display on one face only.

Volume of Space or Room (V_c): The volume between physical barriers which may limit the movement of fire products (e.g. fire doors in cross corridor partitions). The space shall have a maximum average length to width ratio of 4:1. If the ratio exceeds 4:1, the length of four times the average width shall be used for volume calculation. The volume of a compartment with a ratio exceeding 4:1 shall be calculated by the following formula:

$$4 \times (\text{average width of compartment})^2 \times \text{height}.$$

3.0 Flame Spread Rating: All plastic sign facings shall have a flame spread rating, determined by ASTM E84, not greater than that designated as Class C interior finish by the *Building Code of the City of New York* and Class III interior finish by the *BOCA National Building Code*, for New York and New Jersey, respectively.

Exception: Materials less than 1/28-inch in thickness shall comply with the criteria in NFPA 701, "Flame Tests for Flame-resistant Textiles and Films," or when tested in accordance with ASTM D568, "Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Flexible Plastics in a Vertical Position," exhibit an average burn time for ten specimens of 15 seconds or less and a burning extent of 15 centimeters or less.

4.0 Allowable Sign Facing Area: The area of an individual plastic sign facing shall not exceed the limitations established in paragraph 4.1 through paragraph 4.6, or as calculated in accordance with the Appendix to this standard. The maximum area of all signs in a space shall not exceed 20 percent of the aggregate wall and ceiling area of the space. For multiple-faced signs, the calculated allowable area is the total area of all faces of all signs within separation distances specified in paragraph 4.7. Signs which are separated by less than the minimum sign separation distance as given in paragraph 4.7, shall be considered a single sign.

Exception: The area of an individual plastic sign facing is not limited where the portion of the building, where the sign is located, is equipped with an automatic sprinkler system. However, the 20 percent limitation, in the paragraph above, shall apply.

4.1 Polymethylmethacrylate (PMMA) (e.g., Acrylic, Plexiglass, Lucite) Sign Materials: The allowable area of a PMMA sign facing shall be determined from the following equation:

$$A_s = 0.00034 \cdot \frac{V_c}{t} \quad \text{for } t \leq 0.46 \text{ inch}$$

$$A_s = 0.000745 \cdot V_c \quad \text{for } t > 0.46 \text{ inch}$$

Example: Given a space (room or compartment) 50' long by 40' wide with a 10' high ceiling, how large a PMMA (acrylic) sign facing is allowable if PMMA is 0.25" thick?

$$A_s = 0.00034 \cdot \frac{(50)(40)(10)}{0.25} = \frac{6.8}{0.25} = 27.2 \text{ sq.ft.}$$

4.2 Polycarbonate (e.g., GE Lexan S100) Sheet Sign Material: The allowable area of a polycarbonate sign facing shall be determined from the following equation:

$$A_S = 0.00031 \cdot V_c$$

4.3 Polyethylene Teraphthalate (PET) (e.g., IMPET 300) Sign Material: The allowable area of a PET sign facing shall be determined from the following equation:

$$A_S = 0.0000759 \cdot \frac{V_c}{t} \quad \text{for } t \leq 0.41 \text{ inch}$$

$$A_S = 0.000185 \cdot V_c \quad \text{for } t > 0.41 \text{ inch}$$

4.4 Duratrans - Glossy Sign Facing Material: The allowable area of a Duratrans sign facing shall be determined from the following equation:

$$A_s = 0.000046 \cdot \frac{V_c}{t} \quad \text{for } t \leq 0.043 \text{ inch}$$

$$A_s = 0.00108 \cdot V_c \quad \text{for } t > 0.043 \text{ inch}$$

4.5 Duratrans Matte Finish Sign Facing Material: The allowable area of a Duratrans matte finish sign facing shall be determined from the following equation:

$$A_s = 0.0000224 \cdot \frac{V_c}{t} \quad \text{for } t \leq 0.0576 \text{ inch}$$

$$A_s = 0.000389 \cdot V_c \quad \text{for } t > 0.0576 \text{ inch}$$

4.6 Other Plastic Sign Materials: The allowable area of a sign facing constructed from a plastic material not listed in paragraphs 4.1 through 4.5, or from composites of plastics, shall be determined in accordance with the Appendix to this standard. The method in the Appendix may also be used for plastics listed in paragraphs 4.1 through 4.5.

4.7 Sign Separation Distances: The minimum separation distance between any two individual signs shall be in accordance with paragraphs 4.7.1., 4.7.2 and 4.7.3. Signs located less than the minimum sign separation distances apart shall be considered as one sign for allowable sign facing area.

Exception: Sign separation distances do not apply where the signs are located in a space equipped with an automatic sprinkler system.

4.7.1 Single-Faced Sign Separation Distances: The minimum separation distance between two adjacent signs with a single side of sign facing shall be 6 feet.

4.7.2 Multiple-Faced Sign Separation Distances: The minimum separation distance between two signs with multiple faces on different planes shall be 13 feet.

4.7.3 Ceiling Sign Separation Distances: Signs greater than 10 feet in length and one foot in height shall have a minimum separation distance of 10 feet, except as noted in 4.7.2. Other signs shall conform to sections 4.7.1.

4.8 Minimum Dead End Passage Width for Signs: Minimum passage width applies to dead end corridors and rooms having means of egress in locations requiring an occupant to pass by a sign. The minimum passage width shall be 20 feet in locations where an occupant must pass a single-faced sign, and 28 feet in locations where an occupant must pass a multiple-faced sign to exit. The minimum passage width (P_w) is defined as the minimum distance between an egress path and a sign, i.e., the closest an occupant will be to the sign during egress. The minimum passage width or height (for ceiling signs) where an occupant must pass by a sign which is perpendicular to the occupants path of travel shall be calculated from the following equation:

$$P_w = 0.00255 \cdot L^{3.654} \mid for\ L \geq 2\ ft$$

Exception: There is no restriction for signs less than 4 square feet in area and ceiling signs less than 2 feet long.

Appendix to Attachment A1

Calculation of Allowable Sign Area for Signs of Any Plastic Material or Composite of Plastics.

A.1 Definitions, symbols and notations: The following definitions, symbols and notations shall apply to the provisions of this Appendix (units in parenthesis are for the variable described):

A_S (ft^2) =	Allowable sign facing area
A_1 (ft^2) =	Initial allowable sign facing area based on Figure A-1
A_2 (ft^2) =	Corrected allowable sign area based on the time to burn through a sign
$\Delta H_{c,40}$ (kJ/kg) =	Heat of combustion for an incident heat flux of 40 kW/m^2
L (ft) =	The length along the ceiling of a ceiling sign
M''_{40} ($kg/s\text{-}m^2$) =	The average specimen mass loss rate of the fuel per unit area with a radiant flux exposure of 40 kW/m^2. Mass loss rate shall be determined in accordance with average horizontal specimen mass loss rate in ASTM E- 1354
P_w (ft) =	Minimum distance between an egress path and a sign. Distance can be passage width or height
t_b (sec) =	Time to burn through a specimen, used to correct allowable areas for thin signs
t (inches) =	Thickness of sign facing material(s)
V_c (ft^3) =	Volume of space or room in which the sign is located
$\sigma_{m,40}$ (m^2/kg) =	Specific extinction area, on a mass loss basis for an incident heat flux of 40 kW/m^2
ρ (kg/m^3) =	Density of sign material
SP (1/s) =	Smoke production factor used to determine uncorrected sign area based on volume

A.2 All plastic sign facings shall meet the flame spread rating criteria specified in paragraph 5.0. All test results and material properties used in the following calculations must be submitted for approval.

A.3 The allowable area of a sign facing constructed from plastic materials shall be determined in accordance with the following procedure: The procedure is applicable for all plastic materials including those listed in paragraphs 4.1 - 4.5.

1. Obtain the sample mass density ρ, in kg/m³

2. Obtain the following from ASTM E 1354:

   a) The average specimen mass loss rate per unit area under for an incident heat flux of 40 kW/m² (M''_{40}).

   b) The average specific extinction area for an incident heat flux of 40 kW/m² ($\sigma_{m,40}$).

   c) The average effective sample heat of combustion for an incident heat flux of 40 kW/m² ($\Delta H_{C,40}$).

3. Calculate the material's smoke production factor (SP)

$$SP = \sigma_{m,40} \cdot M''_{40}$$

4. Using Figure A-1 and the appropriate values of SP and V_C, estimate the value of A_1.

5. The initial corrected allowable area of a combustible sign facing (A_2) based on the thickness of the material shall be calculated using the following formulas:

$$A_2 = \frac{600}{t_b} \cdot A_1$$

where t_b is determined by the following formula:

$$t_b = 0.0254 \cdot \frac{\rho \cdot t}{M''_{40}}$$

Exception: If t_b is greater than 600, then a corrected area is not required, i.e., $A_2 = A_1$.

6. The final allowable area of a combustible sign facing (A_S) based on the heat release rate properties of the combustible materials shall be calculated using the following formula:

$$A_s = \frac{452}{M''_{40} \cdot \Delta H_{c,40}} \cdot A_2$$

Exception: If $M''_{40} \cdot \Delta H_{c,40}$ is less than 452.0 kW/m², a corrected area is not required, i.e., $A_S = A_2$.

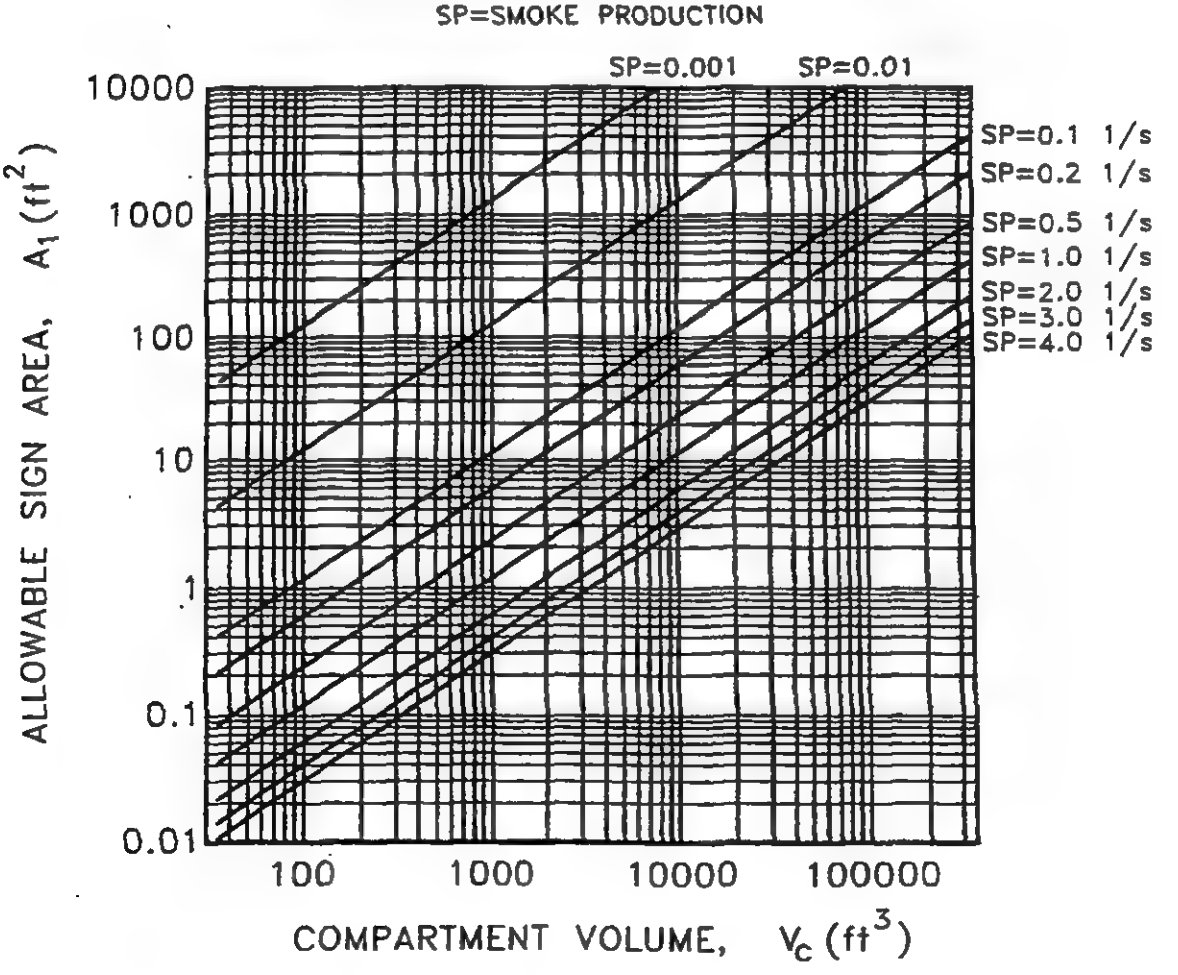


Figure A-1

Allowable Sign Area as a Function of the Smoke Production and Room Volume

7. Allowable facing area of composite sign materials shall be determined in the same fashion as signs with single materials. Material properties of the composite sign (M''_{40}, σ_s, ΔH_c, ρ) shall be a weighted average of each component mass material. For example, material properties of a composite with two materials shall be determined via

$$M''_{40} = \frac{mass_1}{mass\ total} \cdot M''_{40,1} + \frac{mass_2}{mass\ total} \cdot M''_{40,2}$$

$$\sigma_m = \frac{mass_1}{mass\ total} \cdot \sigma_{m,1} + \frac{mass_2}{mass\ total} \cdot \sigma_{m,2}$$

$$\Delta H_c = \frac{mass_1}{mass\ total} \cdot \Delta H_{c,1} + \frac{mass_2}{mass\ total} \cdot \Delta H_{c,2}$$

$$\rho = \frac{mass_1}{mass\ total} \cdot \rho_1 + \frac{mass_2}{mass\ total} \cdot \rho_2$$

where 1 and 2 refer to materials number one and two.

ATTACHMENT A2

SPECIFICATIONS GOVERNING THE FLAMMABILITY OF DRAPERY AND CURTAIN MATERIALS IN UNSPRINKLERED AREAS

A. All drapery and curtain materials, including linings, shall be subject to the vertical flame tests as required by Federal Aviation Regulation FAR 25.853(a) and Appendix F, revised February 2, 1995.

The test method requires that the flame shall be applied for 12 seconds and then removed, that the average char length shall not exceed eight (8) inches, that the average flame time after removal of the flame specimen shall not continue to flame for more than five (5) seconds after falling.

B. The manufacturer of the finished item shall submit written certification for each component fabric of the completed items as follows:

1. If the material contains 100% fibers that are inherently flame resistant by virtue of the physical properties of the untreated fiber, a written certification by a recognized independent testing laboratory, attesting to the permanent flame resistant properties of all the fibers within, shall be submitted to the Port Authority.

2. If the material contains fibers which are not inherently flame resistant in the untreated state, a written certification by a recognized independent testing laboratory shall be submitted to the Port Authority, attesting that the treated materials have maintained their flame resistant properties, as determined by the burn test in paragraph A above, after five (5) washings and/or dry cleanings. The washing test procedure shall be performed as defined by the Technical Manual of the American Association of Textile Chemists and Colorists (AATCC) Test Method 124-1978 using the wash temperature of 120° ±5°F and the "Tumble Dry" procedure. The dry cleaning test procedure shall be performed by subjecting the material to dry cleaning in a "Coin-OP" machine as manufactured by Norge or Wastinghouse or an equal machine. The size sample of material and the machine size are to be commensurable to each other. When necessary, dummy pieces of material shall be added to the test specimens to make up a load equal to the machine rating.

ATTACHMENT A3

SPECIFICATIONS GOVERNING THE FLAMMABILITY OF UPHOLSTERY MATERIAL AND PLASTIC FURNITURE IN UNSPRINKLERED AREAS

A. All upholstery materials, including covering, interliner, lining, webbing, cushioning, and padding shall be subject to the vertical flame test as required by Federal Aviation Regulation FAR 25.853(a) and Appendix F, revised February 2, 1995.

The test method requires that the flame be applied for 12 seconds and then removed, that the average burn length shall not exceed eight (8) inches, that the average flame time after removal of the flame source shall not continue to flame for more than an average of five (5) seconds after falling.

Test samples subject to the vertical test shall be tested using the thickness of the material as used in the finished product; except that, the maximum thickness of a test sample shall be one-half inch (1/2") in cases where the final product material exceeds that thickness.

B. Padding that exceeds one-half inch (1/2") thickness and all cushioning, in addition to meeting the requirements of Section A above, shall be tested in accordance with the Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source - ASTM E162-94. Wire mesh screen and aluminum foil shall be used as indicated in Section 5.8.1 of this standard test method.

1. Padding and cushioning with a flame propagation index not exceeding 100 is acceptable for use with an external covering that meets the requirements of Section A of this specification.

2. Padding and cushioning with a flame propagation index exceeding 100 may be covered with materials or interliners complying with paragraph A of this specification. However, the final assembly of these materials which make up the cushion, arm rest, or other parts of the furniture, shall be subject as a composite unit to Standard Test Method ASTM E162-94. Composite assemblies with a flame spread index not exceeding 100 will be acceptable.

C. All self-supporting plastic materials shall be subject to the vertical flame test as required by FAR 25.853(a) and Appendix F. The test

method requires that the flame be applied for 60 seconds and then removed, that the average burn length shall not exceed six (6) inches, that the average flame time after removal of the flame source shall not exceed 15 seconds, and that drippings from the test specimens shall not continue to flame for more than an average of three (3) seconds after falling.

D. The thickness of the materials and of the composite assemblies tested under paragraphs B land C above shall be the same as the thickness used in the finished item. Certification submitted by the manufacturer shall indicate the thickness of the materials as tested.

E. The manufacturer of the finished item shall submit a certification by a recognized, independent, testing laboratory of the results of the tests specified above and of the service life of the flame retardancy of a treated material or a certification that the flammability characteristics of the material are inherent therein by virtue of the chemical properties of the material. Treated material may be used only when the certified flame retardant service life exceeds that of the planned service life of the finished item.

ATTACHMENT A4

SPECIFICAITONS GOVERNING THE FLAMMABILITY OF PLASTIC LAMINATE AND WOOD VENEER FURNITURE IN UNSPRINKLERED AREAS

A. Test and Criteria:

1. Flame spread indices for this specification shall be determined by either ASTM-E-84 or ASTM-E162. Flame spread indices shall not exceed 25.

2. The vertical flame test shall be performed in accordance with Federal Aviation Regulation, FAR 25.853(a) and Appendix F, revised February 2, 1995. This test method requires that the flame be applied for 12 seconds and then removed, that the average burn length shall not exceed eight (8) inches, that the average lame time after removal of the flame source shall not exceed 15 seconds, and that drippings from the test specimen shall not continue to flame for more than five (5) seconds after falling.

B. Free Standing Office Partitions:

1. All core and/or structural materials shall be tested and meet the requirements specified in A.1 above.

2. All insulation and covering materials shall be tested and meet the requirements specified in A.2 above.

C. Desk, Tables, Credenzas, Bookcases, etc.:

1. All core and/or structural materials shall be tested and meet the requirements specified in A.1 above.

2. Plastic laminate or wood veneer layer materials having a thickness not greater than 1/28 inch shall be tested and meet the requirements specified in A.2 above.

3. Plastic laminates or veneer layer materials having a thickness greater than 1/28 inch shall be subject to vertical flame test as per

Federal Aviation Regulation, FAR 25.853(a) or (c), and Appendix F determined by the P.A.'s Risk Management Division.

4. The application of intumescent coatings to achieve fire resistance shall be reviewed by the P.A.'s Risk Management Division.

D. Certification:

The supplier of the finished item shall submit a certification and test data by a recognized independent testing laboratory of the results of the tests specified above. The certification and tests shall cover the materials supplied in the finished product. Proof of use of U.L. labeled products meeting the specified flammability criteria will be accepted in lieu of the certification.

DESIGN CRITERIA FOR INACCESSIBLE PLASTER CEILINGS

I. LOADING

A. DEAD LOAD (DL) : 15 PSF FOR CEMENT PLASTER AND 10 PSF FOR GYPSUM PLASTER:
   a. USE ACTUAL WHEN GREATER THAN 15 PSF OR 10 PSF, RESPECTIVELY.
B. LIVE LOAD (LL) : 200LBS CONCENTRATED LOAD.
C. WIND LOAD (W) : (EXTERIOR CEILINGS ONLY):
   a. UP TO 50 FT. CEILING HEIGHT: 30 PSF POSITIVE PRESSURE OR 20 PSF SUCTION NORMAL TO SURFACE.
   b. HIGHER THAN 50 FT.: USE WIND FORCES IN ACCORDANCE WITH NEW YORK CITY CODE (NY) OR ANSI A58.1.1982 (NJ).
   c. EACH CEILING PANEL SHALL RESIST A LATERAL WIND FORCE OF 2.5 PSF OR 8.5 PERCENT OF THE POSITIVE WIND PRESSURE, WHICHEVER IS GREATER, ACTING PARALLEL TO THE CEILING SURFACE.
D. LOADING COMBINATIONS:

CEILING COMPONENT	INTERIOR	EXTERIOR
• WIRE TIES • FURRING CHANNEL • CARRYING CHANNEL (MAIN RUNNER)	DL	DL DL + W
• FURRING CHANNEL TO CARRYING CHANNEL (MAIN RUNNER CONNECTION) • HANGER CONNECTIONS • CONNECTION TO STRUCTURE	DL + LL	DL + LL DL + LL + W
• HANGERS	DL + LL	TENSION: DL + LL DL + LL + W (SUCTION) COMPRESSION: DL + W
• BRACING	–	W

A 33 PERCENT INCREASE IN ALLOWABLE STRESSES IS PERMITTED FOR LOADING COMBINATION DL + LL + W ONLY.

III. MATERIALS

A. IN ADDITION TO THE MATERIALS SPECIFIED IN SECTION II, THE FOLLOWING MATERIAL SPECIFICATIONS SHALL BE FOLLOWED:
   1. PLASTER: ASTM C826-81 AND ANSI A42.2.
   2. SURFACE APPLIED BONDING AGENTS FOR EXTERIOR PLASTERING: ASTM C932-80.
   3. LATH: ASTM C841 AND ANSI A42.3.
B. THE FOLLOWING MATERIALS SHALL NOT BE USED:
   1. METAL DECK TABS AND HOOKS.
   2. POWER ACTUATED ANCHORS.
   3. WIRE HANGERS.
   4. STOVE BOLTS.
C. THE CONTRACTOR SHALL BE REQUIRED TO SUBMIT CATALOG CUTS, SAMPLES, LAYOUT DRAWINGS AND DETAILS OF ALL COMPONENTS OF CEILING SUPPORT SYSTEM FOR THE ENGINEER'S APPROVAL PRIOR TO STARTING OF ANY WORK IN THE FIELD.

IV. JOINTS

A. CONTROL JOINTS (DWG. S2-SECT. S6a AND S6b): MAXIMUM LENGTH OF CEILING PANEL BETWEEN CONTROL JOINTS SHALL BE 40 FT. AND MAXIMUM AREA OF THE PANEL SHALL BE 1600 SQ.FT.
B. EXPANSION JOINTS (DWG. S2-SECT. S6 AND S6b): LOCATION AND SIZE OF CEILING EXPANSION JOINTS SHALL MATCH BUILDING EXPANSION JOINTS. EXPANSION JOINTS ARE ALSO REQUIRED WHERE CEILING CHANGES DIRECTION.

II. DESIGN OF CEILING COMPONENTS

CEILING COMPONENT	DESIGN PARAMETER	INTERIOR CEMENT PLASTER CEILINGS	INTERIOR GYPSUM PLASTER CEILINGS	EXTERIOR CEMENT PLASTER SOFFITS	MATERIALS	NOTES
WIRE TIES	MAXIMUM SPACING MINIMUM SIZE	6 INCHES 16 GAGE	6 INCHES 16 GAGE	6 INCHES 16 GAGE	STAINLESS STEEL AISI TYPE 304 OR MONEL METAL	a. MIN. DOUBLE LOOP AROUND LATH AND CHANNEL WITH MIN. THREE TWISTED TURNS. b. IN LIEU OF WIRE TIES, B.S. & A.* OR I.C.B.O.** APPROVED CLIPS MAY BE USED.
FURRING CHANNEL	MAXIMUM SPAN (DIM. W) MAXIMUM SPACING (DIM. F) MINIMUM SIZE	4'-6" 1'-6" 1 1/2" COLD ROLLED CHANNEL (475LBS/1000 L.F.)	4'-6" 1'-6" 1 1/2" COLD ROLLED CHANNEL (475LBS/1000 L.F.)	4'-6" 1'-6" 1 1/2" COLD ROLLED CHANNEL (475LBS/1000 L.F.)	HOT ROLLED ASTM A36 OR COLD ROLLED CHANNELS, GALVANIZED FOR EXTERIOR AND PAINTED FOR INTERIOR.	a. MAX. DEFLECTION < SPAN/360. b. FURRING CHANNELS AND EDGE CASING BEADS SHALL BE INTERRUPTED AT CONTROL AND EXPANSION JOINTS. c. EDGE CASING BEAD AND EDGE BEAM SHALL NOT BE USED AS SUPPORT FOR CEILING. d. WHERE LIGHT FIXTURE OPENING REQUIRES CUTTING OF ONE FURRING CHANNEL, SUPPORT THE ENDS WITH 1 1/2" CHANNELS. e. WHERE LIGHT FIXTURE OPENING REQUIRES CUTTING OF MORE THAN ONE FURRING CHANNEL, USE CARRYING CHANNELS AND HANGERS ON EACH SIDE OF THE OPENING. f. FURRING CHANNEL SPLICES SHALL BE AS SHOWN ON DWG. S2-TYPICAL CHANNEL SPLICE DETAIL.
CARRYING CHANNEL	SPACING (DIM. W AVG.) SPAN (DIM.S) SIZE	TABLE 'IP'	TABLE 'IG'	TABLE 'E'	HOT ROLLED ASTM A36 OR COLD ROLLED CHANNELS, GALVANIZED FOR EXTERIOR AND PAINTED FOR INTERIOR.	a. MAX. DEFLECTION < SPAN/360. b. CARRYING CHANNELS SHALL BE INTERRUPTED AT CONTROL AND EXPANSION JOINTS. c. CARRYING CHANNELS SHALL NOT BE INTERRUPTED FOR LIGHT FIXTURE OPENINGS. d. CARRYING CHANNEL SPLICES SHALL BE AS SHOWN ON DWG. S2-TYPICAL CHANNEL SPLICE DETAIL.
FURRING CHANNEL TO CARRYING CHANNEL CONNECTION	MINIMUM SIZE	MIN. 3 LOOPS OF 16 GAGE WIRE OR L 1 1/2 X 1 1/2 X 1/4 X 2 1/2" LONG WITH 3/8"ø A307 BOLTS OR CLIPS WITH B.S. & A. OR I.C.B.O. APPROVAL FOR DESIGN LOADS.	MIN. 3 LOOPS OF 16 GAGE WIRE OR L 1 1/2 X 1 1/2 X 1/4 X 2 1/2" LONG WITH 3/8"ø A307 BOLTS OR CLIPS WITH B.S. & A. OR I.C.B.O. APPROVAL FOR DESIGN LOADS.	MIN. 3 LOOPS OF 16 GAGE WIRE OR L 1 1/2 X 1 1/2 X 1/4 X 2 1/2" LONG WITH 3/8"ø A307 BOLTS OR CLIPS WITH B.S. & A. OR I.C.B.O. APPROVAL FOR DESIGN LOADS.	HOT ROLLED ASTM A36 OR COLD ROLLED CHANNELS, GALVANIZED FOR EXTERIOR AND PAINTED FOR INTERIOR.	SEE DWG. S2-SECTION 3 FOR TYPICAL DETAIL.
HANGER CONNECTIONS	MINIMUM SIZE	ONE 3/8"ø BOLT	ONE 3/8"ø BOLT	ONE 3/8"ø BOLT	A307 BOLTS, NUTS AND LOCK WASHER (GALVANIZED)	SEE DWG. S2-SECTIONS 2 AND 2a FOR TYPICAL DETAILS.
HANGER	MINIMUM SIZE MAXIMUM SPACING	1 1/2 X 1/4" STRAP 4'-6" O.C. EACH WAY ACTUAL SPACING DEPENDS ON CARRYING CHANNEL SIZE-SEE TABLE IP	1 1/2 X 1/4" STRAP 4'-6" O.C. EACH WAY ACTUAL SPACING DEPENDS ON CARRYING CHANNEL SIZE-SEE TABLE IG	L 1 1/2 X 1 1/2 X 1/4" 4'-6" O.C. EACH WAY ACTUAL SPACING DEPENDS ON CARRYING CHANNEL SIZE-SEE TABLE E	HOT ROLLED ASTM A36 STEEL. GALVANIZED FOR EXTERIOR AND PAINTED FOR INTERIOR	a. HANGER SPLICES SHALL HAVE A MINIMUM OF 2-3/8"ø BOLTS WITH NUTS AND LOCK WASHERS b. HANGER SHALL BE VERTICALLY PLUMB.
CONNECTION TO STRUCTURE		SEE DRAWING S3	SEE DRAWING S3	SEE DRAWING S3	SEE DRAWING S3	MINIMUM THICKNESS OF STEEL MEMBERS FOR EXTERIOR SOFFITS SHALL BE 1/4".
BRACING		NONE REQUIRED	NONE REQUIRED	MIN. TWO BRACINGS IN EACH DIRECTION PER PANEL		SEE DWG. S2-SECTIONS S4 AND S5.

NOTE: IN CASES WHERE ACTUAL LOADS ARE HIGHER THAN SPECIFIED UNDER LOADING (SECTION I) DESIGN SHALL BE PREPARED IN ACCORDANCE WITH THE DESIGN PROCEDURES FOR RUNNER CHANNELS (METAL LATH MANUFACTURERS ASSOCIATION).

* BOARD OF STANDARDS AND APPEALS OF NEW YORK CITY.
** INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS.

MINIMUM SIZE OF CARRYING CHANNEL FOR INTERIOR INACCESSIBLE PLASTER CEILINGS
TABLE "IP"

'W' AVERAGE \ 'S'	3'-6"	3'-9"	4'-0"	4'-3"	4'-6"
3'-1"	1 1/2" C.R.-[475LBS/ 1000 L.F.				
3'-3"	1 1/2" CHANNEL (HOT ROLLED) MINIMUM WEIGHT = 1120LBS./1000 L.F.				
3'-9"					
4'-0"					
4'-2"					
4'-6"				2" CHANNEL (HOT ROLLED) MINIMUM WEIGHT = 1260LBS./1000 L.F.	

SIZES, SPANS AND SPACINGS SHOWN ARE FOR DEAD LOAD = 15 PSF.

MINIMUM SIZE OF CARRYING CHANNEL FOR INTERIOR INACCESSIBLE GYPSUM PLASTER CEILINGS
TABLE "IG"

'W' AVERAGE \ 'S'	3'-6"	3'-9"	4'-0"	4'-3"	4'-6"
2'-9"	1 1/2" CHANNEL (COLD ROLLED) MINIMUM WEIGHT = 475LBS/1000 L.F.				
3'-0"					
3'-6"				1 1/2" CHANNEL (HOT ROLLED) MINIMUM WEIGHT = 1120LBS/1000 L.F.	
4'-0"					
4'-6"					

SIZES, SPANS AND SPACINGS SHOWN ARE FOR DEAD LOAD = 10 PSF.

MINIMUM SIZE OF CARRYING CHANNEL FOR EXTERIOR INACCESSIBLE PLASTER SOFFITS
TABLE "E"

'W' AVERAGE \ 'S'	3'-0"	3'-3"	3'-6"	3'-9"	4'-0"	4'-6"
2'-1"	1 1/2" CHANNEL (HOT ROLLED) MINIMUM WEIGHT = 1120LBS/1000 L.F.					
2'-4"						
2'-6"			2" CHANNEL (HOT ROLLED) MINIMUM WEIGHT = 1260LBS/1000LBS L.F.			
2'-8"						
3'-1"						
3'-6"						2 1/2" CHANNEL (HOT ROLLED)
4'-0"				MINIMUM WT. 2270LBS/1000 L.F.		

SIZES, SPANS AND SPACINGS SHOWN ARE FOR 15 PSF DEAD LOAD + 20 PSF WIND SUCTION.

Sheet 1 of 3

THE PORT AUTHORITY OF NY & NJ

ORIGINAL SIGNED BY:
CHIEF STRUCTURAL ENGINEER

No. Date Revision Approved

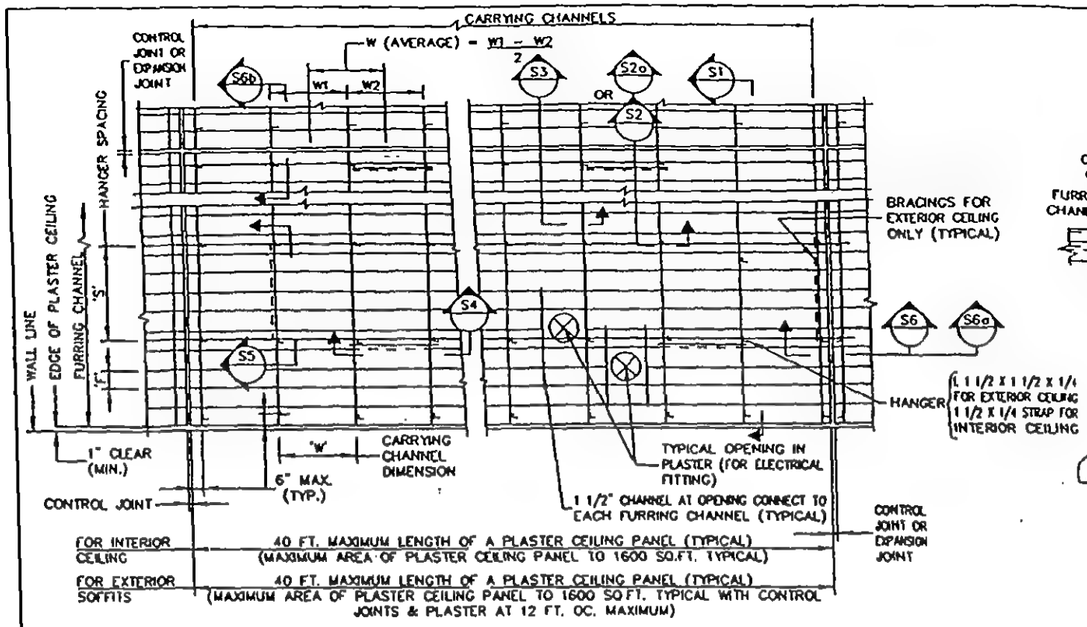
This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written consent.

H. PATEL Designed by | D. MOCK Drawn by | H. PATEL Task Leader

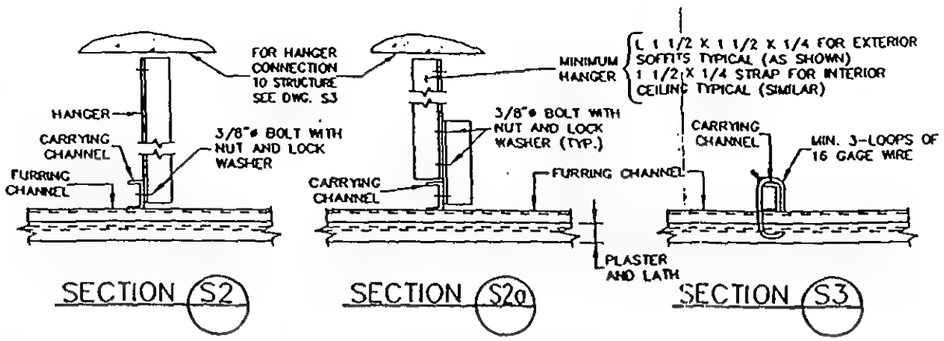
Date OCT. 15, 85

Contract Number | Drawing Number S1-1

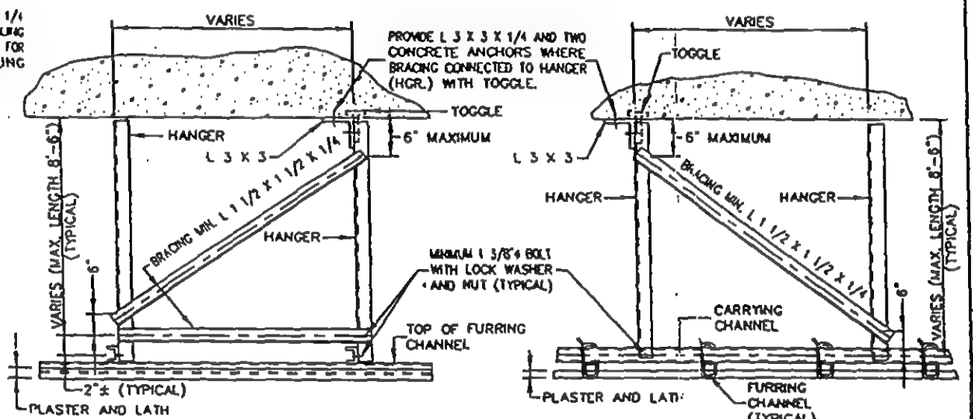
Title
PLASTER CEILING DESIGN STANDARDS



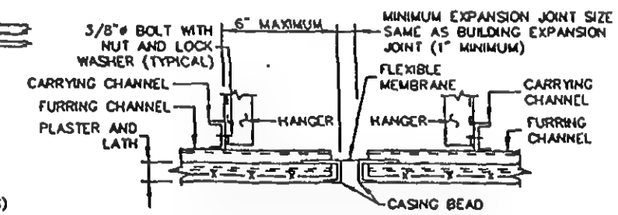
TYPICAL PLAN – EXTERIOR (INACCESSIBLE) PLASTER SOFFITS (SHOWN)
TYPICAL PLAN – INTERIOR (INACCESSIBLE) PLASTER CEILING (SIMILAR)



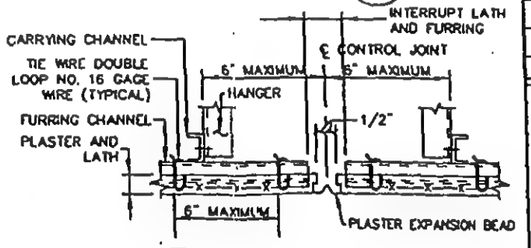
SECTION S2 SECTION S2a SECTION S3



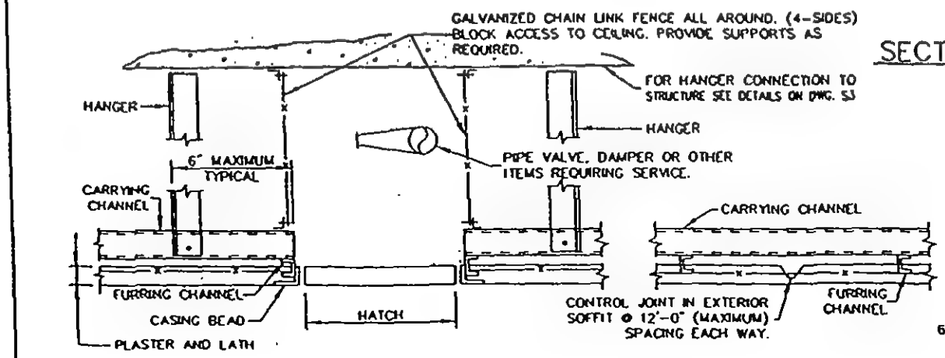
SECTION S4 SECTION S5



SECTION S6 TYPICAL EXPANSION JOINT

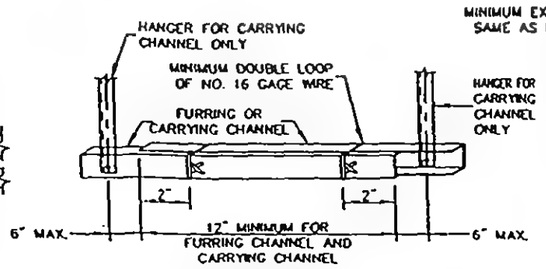


SECTION S6a TYP. CONTROL JOINT

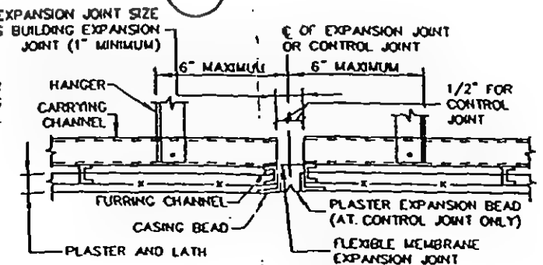


TYPICAL HATCH DETAIL

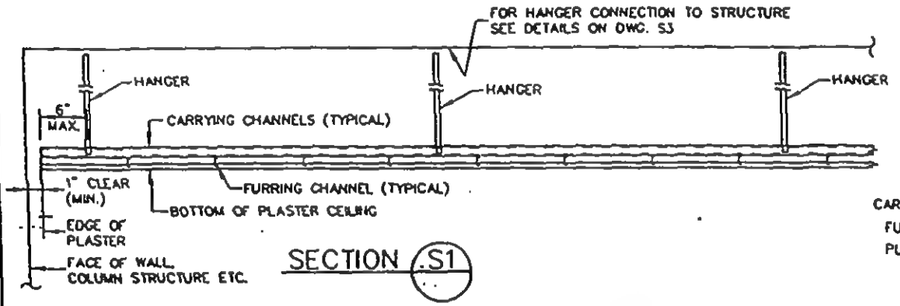
TYPICAL CONTROL JOINT DETAIL IN PLASTER



TYPICAL CHANNEL SPLICE DETAIL



SECTION S6b TYP. EXPANSION JOINT OR CONTROL JT. DET.



SECTION S1

Sheet 2 of 3

THE PORT AUTHORITY OF NY & NJ

ORIGINAL SIGNED BY:
CHIEF STRUCTURAL ENGINEER

Title
PLASTER CEILING DESIGN STANDARDS

No	Date	Revision	Approved

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written consent.

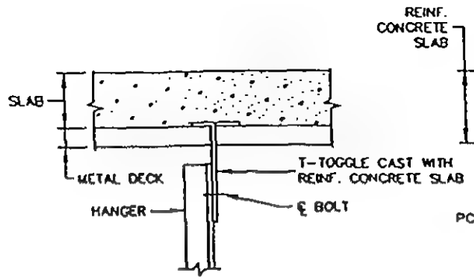
H. PATEL	D. MOCK	H. PATEL
Designed by	Drawn by	Task Leader

Date OCT. 13, 85

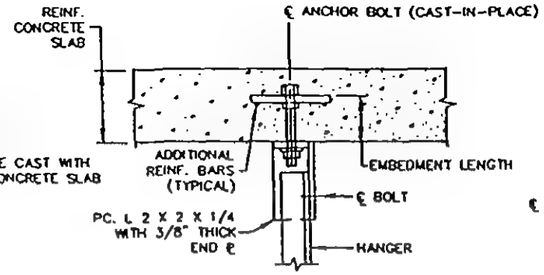
Contract Number

Drawing Number S1-2

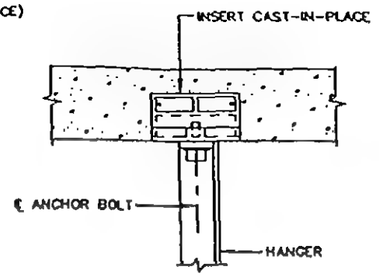
TYPICAL DETAILS FOR HANGER CONNECTION TO STRUCTURE



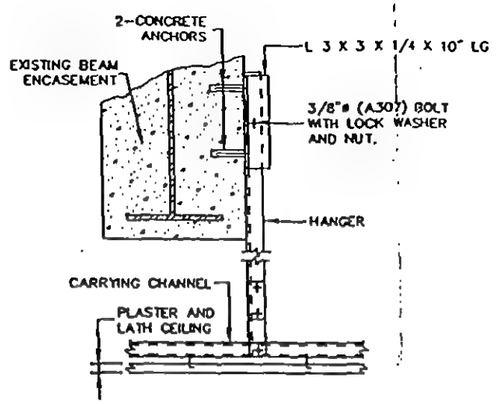
DETAIL – A
TOGGLE IN CONCRETE SLAB OVER METAL DECK



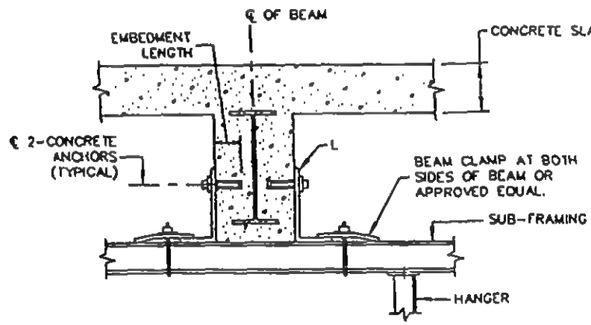
DETAIL – B
CAST IN ANCHOR BOLT IN CONCRETE SLAB



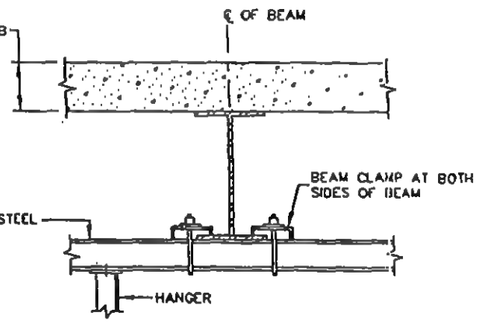
DETAIL – C
INSERT IN CONCRETE SLAB



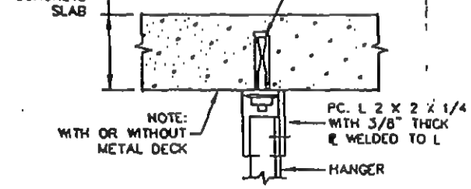
DETAIL – D
CONCRETE ANCHORS IN ENCASED STEEL BEAM



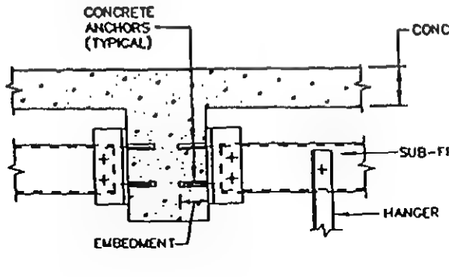
DETAIL – F
SUBFRAMING AT ENCASED BEAM



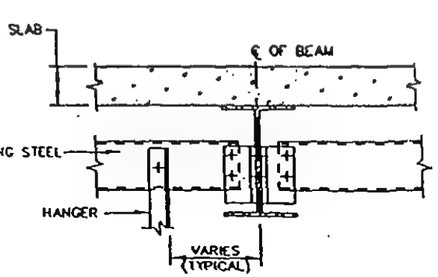
DETAIL – G
SUBFRAMING CLAMPED TO STEEL BEAM



DETAIL – E
CONCRETE ANCHOR IN SLAB



DETAIL – H
SUBFRAMING AT CONCRETE BEAM



DETAIL – I
SUBFRAMING CONNECTED TO STEEL BEAM

CONNECTION TO STRUCTURE–MATERIALS

1. T–TOGGLES (DETAIL A):
   GALVANIZED, MINIMUM SIZE 1 1/2" X 1/4" USE WITH NEW SLAB CONSTRUCTION WITH METAL DECK.
2. CONCRETE INSERTS (DETAILS B AND C):
   USE WITH NEW SLAB CONSTRUCTION WITHOUT METAL DECK.

   ACCEPTABLE TYPES:
   UNISTRUT – P3200 SERIES, P3300 SERIES AND M24 (SPOT).
   B-LINE – B2505.
   DAYTON – SUPERIOR–F14 OR APPROVED EQUAL.
3. CONCRETE ANCHORS (DETAILS D AND E):

   ACCEPTABLE TYPES:
   HILTI – HSL AND HSLB.
   LIEBIG – SAFETY BOLTS.
4. STEEL SUB–FRAMING (DETAILS F, G, H AND I):
   DESIGN IN ACCORDANCE WITH AISC OR AISI (COLD FORMED).

Sheet 3 of 3

ORIGINAL SIGNED BY:
CHIEF STRUCTURAL ENGINEER

Title
PLASTER CEILING DESIGN STANDARDS

No	Date	Revision	Approved

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written consent.

H. PATEL	D. MOCK	H. PATEL
Designed by	Drawn by	Task Leader

Date OCT. 15, 85

Contract Number

Drawing Number
S1–3

ATTACHMENT S2

SUSPENDED LIGHTWEIGHT CEILINGS DESIGN CRITERIA

A. New York:

The design and installation of all lightweight ceiling components shall comply with NYC Building Code Section 27-350 and RS 5-16 with the following exceptions:

1. Metal deck tabs shall not be used for top hanger connection.

2. In the World Trade Center Tower floors with double truss, the ceiling support system shall comply with Standard Drawing S2.

B. New Jersey:

The design and installation of all lightweight ceiling components, except hangers and their top and bottom connections, shall comply with:

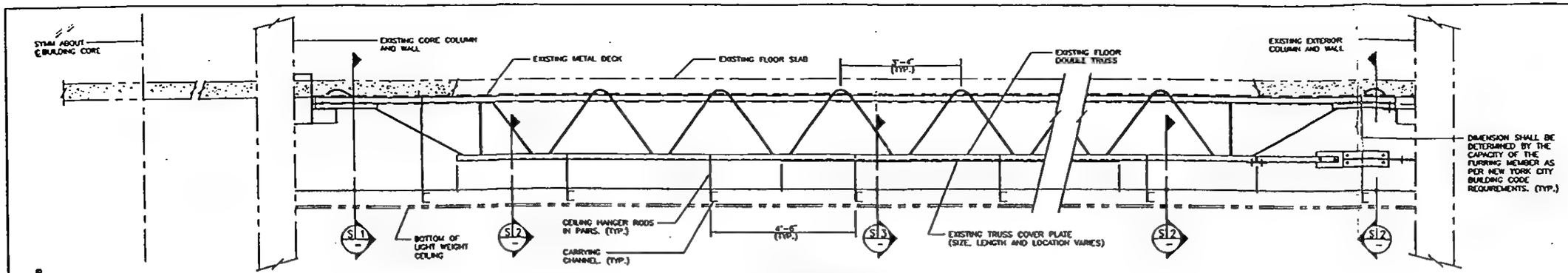
ASTM C635	Standard Specification for Metal Suspension Systems for Acoustical Title and Lay-in Panel Ceilings.
ASTM C636	Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

For the design and installation of hangers and their top and bottom connections, modify the above ASTM Standards as follows:

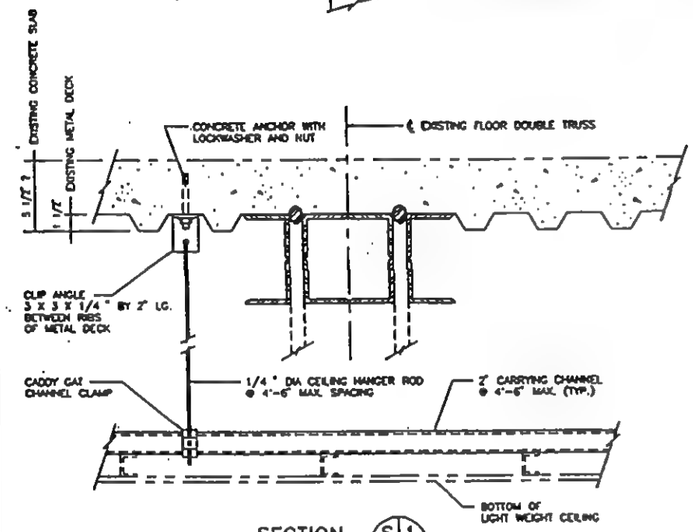
a. The hanger and its connections shall safely carry the total supported load plus 200 pounds. The additional load is consistent with fire department recommendations to avoid progressive collapses.

b. Hangers for suspending carrying channels or main runners from an existing structure shall be 1/4-inch diameter galvanized steel rods, 1/8" x 1" galvanized steel flat bars, or 9-gauge galvanized, soft-annealed, mild steel wire.

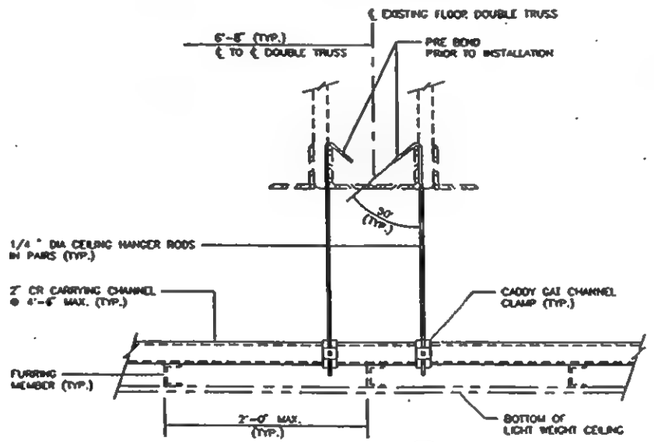
c. Metal deck tabs shall not be used for top hanger connection.



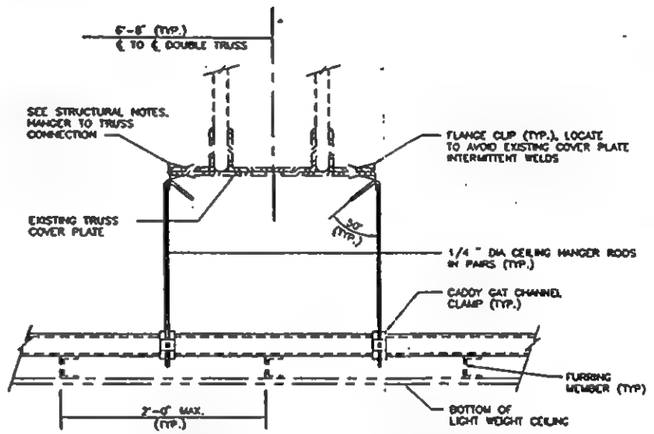
PART ELEVATION
TYPICAL FLOOR DOUBLE TRUSS



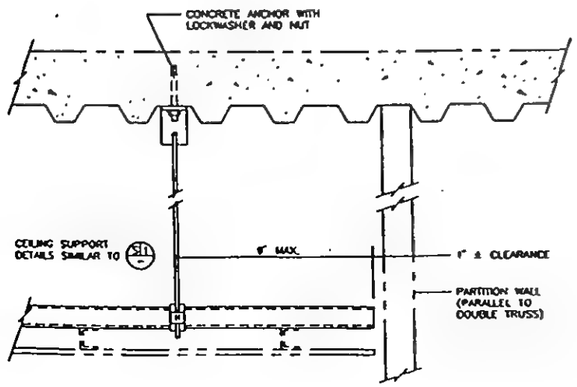
SECTION S1



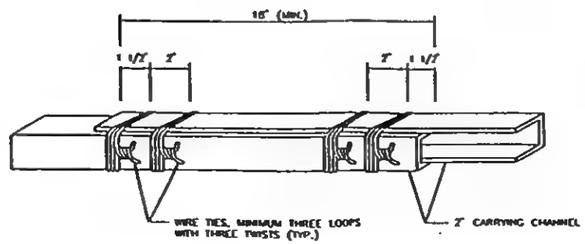
SECTION S2



SECTION S3 CEILING SUPPORT DETAIL AT COVER PLATE ONLY



TYPICAL SECTION AT PARTITION WALL



TYPICAL "2" CHANNEL SPLICE DETAIL

NOTES:

1. MATERIALS
   - CONCRETE ANCHORS - 3/8 " ϕ HILTI KWIK BOLT II (TYPE KB II) WITH A MINIMUM EMBEDMENT OF 1 3/4 " OR HILTI HSL OR HSLB ANCHORS, SIZE M8 WITH A MINIMUM EMBEDMENT OF 2 1/2 " AND A MAXIMUM EMBEDMENT LENGTH OF 3".
   - CLIP ANGLES - HOT ROLLED ASTM A36 STEEL.
   - HANGERS - 1/4 " DIA A36 GALVANIZED STEEL ROD.
   - CARRYING CHANNEL - 2" COLD ROLLED CHANNELS (Fy=33KSI MIN.) MINIMUM WEIGHT 590 LBS /1,000 L FT.(PAINTED)
   - HANGER TO TRUSS CONNECTION - AT COVER PLATE ONLY
     A. THICKNESS OF BOTTOM FLANGE OF TRUSS t < 0.75": CADDY HEAVY DUTY FLANGE CLAMPS MANUFACTURED BY ERICO PRODUCTS INC. BSA #1312-64-SM.
     B. THICKNESS OF BOTTOM FLANGE OF TRUSS t > 0.75": UNIVERSAL C-CLAMP FIG.93 (WIDE THROAT) 0.41 LBS. EACH AS MANUFACTURED BY GRINNELL CORP. OR APPROVED EQUAL. INSTALL C-CLAMP WITH SET SCREW IN TOP POSITION.
   - HANGER TO CARRYING CHANNEL - CADDY CAT CHANNEL CLAMP, MODEL 482LS. AS MANUFACTURED BY ERICO PRODUCTS INC. BSA #131-68-SM.
   - WIRE TIES - 16 GA. STAINLESS STEEL ASTM - TYPE 304 OR MONEL METAL.
2. REMOVAL OF FIREPROOFING SHALL BE KEPT TO A MINIMUM AND SHALL BE REPLACED BY THE TENANT'S CONTRACTOR .
3. OTHER CEILING COMPONENTS AND DETAILS NOT SHOWN SHALL CONFORM TO THE LATEST NEW YORK CITY BUILDING CODE REQUIREMENTS.
4. THE RAMSET FASTENING SYSTEM WITH LADD DRIVE PIN #684 (1 1/2 " LONG), POWER LEVEL "RED" FOR INSTALLATION, AND THE LADD CEILING CLIP #651 IS PERMITTED TO SUBSTITUTE THE HANGER TOP CONNECTION DETAIL SHOWN IN SECTION 4/S1. ANCHORED INTO 3000 P.S.I. LIGHT WEIGHT CONCRETE SLAB OVER 1 1/2" GALVANIZED METAL DECK.

Sheet of

THE PORT AUTHORITY OF NY & NJ

ORIGINAL SIGNED BY JAMES AMSLEY
ENGINEERING PROGRAM MANAGER, W.T.C.

ORIGINAL SIGNED BY OSCAR SUROS
CHIEF STRUCTURAL FOR DESIGN

No.	Date	Revision	Approved
3	3/31/97	MODIFIED BY G40 FOR TENANT PROJECTS	S.S.
2	11/5/96	DWG. TRANSFERED TO CAD SYSTEM. REVISED ORIENTATION OF METAL DECK	O.S./J.A.
1	7/14/97	ADDED NOTE #5	O.S./P.W.

Engineering Department
Design Division

The World Trade Center

Title

STRUCTURAL

LIGHT WEIGHT CEILING SUPPORT SYSTEM FOR FLOORS W/DBL TRUSS

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority, and may not be used without its written consent.

M.H.	D.O.S.	CY. CHU
Designed by	Drawn by	Test Loader

SENIOR ENGINEER CY. CHU
Date Scale N.T.S.

Contract Number Drawing Number S2

ATTACHMENT S3

MODIFICAITONS TO THE NEW YORK CITY BUILDING CODE EARTHQUAKE LOADS

Revise Table No. 23-P of RS 9-6 by:

a. Adding after II.1.b.
"c. Overhead Signs .. .. 2.00";

b. Adding after II.3.
"4. Anchorage for suspended ceilings weighing more than 4 psf without the weight of light fixtures .. .. .. 0.75";

c. Adding after III.1.
"2. Elevator and counterweight guardrails and supports 1.25"

"3. Sprinkler piping[5] .. .. 2.00"

"4. Gas and high hazard piping .. .. .. 2.00"

"5. Other piping[6] .. .. 0.67"

"6. HVAC ducts[6] .. .. 0.67"

d. Adding the following notes after Note 4 at the bottom of the table:

"5. The design of seismic restraints for sprinkler piping in compliance with NFPA 13 using a design acceleration of 0.15 is acceptable in lieu of compliance with these provisions.

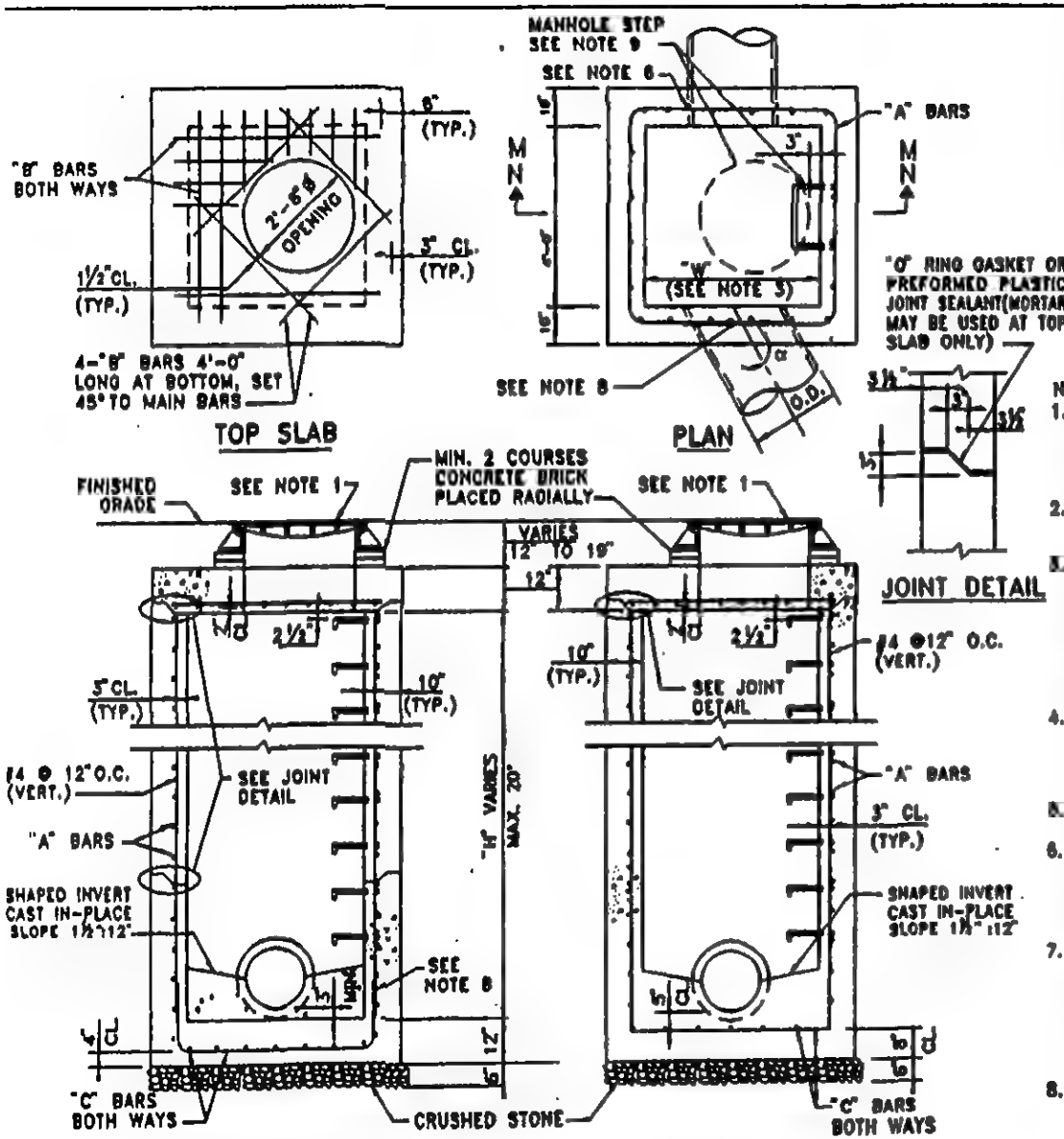
6. Seismic restraints are not required for any of the following conditions for other pipe systems of HVAC ducts:

i. Piping or ducts suspended by individual hangers 12 inches or less in length from the top of the pipe or ducts to the supporting structure.

ii. Piping in boiler and mechanical rooms which has less than 1-1/4 inches inside diameter.

iii. Piping in other areas which has less than 2-1/2 inches inside diameter.

iv. Ducts which have a cross-section area less than 6 square feet."



MANHOLE-AIRCRAFT

010.010 AIRMH

REINFORCEMENT TABLE

DIMENSION "W"	DIMENSION "H"	"A" BAR	"B" BAR	"C" BAR
4' TO 6'	UP TO 10'	#4 @ 5"	#6 @ 6" O.C	#6 @ 8" O.C.
4' TO 6'	10' TO 15'	#4 @ 5"	#8 @ 6" O.C	#6 @ 8" O.C.
4' TO 6'	15' TO 20'	#6 @ 6"	#8 @ 6" O.C	#6 @ 8" O.C.
6' TO 7'	UP TO 10'	#4 @ 5"	#10 @ 6" O.C.	#8 @ 12" O.C.
6' TO 7'	10' TO 15'	#5 @ 5"	#10 @ 6" O.C.	#8 @ 12" O.C.
6' TO 7'	15' TO 20'	#8 @ 10"	#10 @ 6" O.C.	#8 @ 12" O.C.
7' TO 8'	UP TO 10'	#5 @ 5"	#11 @ 6" O.C.	#8 @ 10" O.C.
7' TO 8'	10' TO 15'	#8 @ 10"	#11 @ 6" O.C.	#8 @ 10" O.C.
7' TO 8'	15' TO 20'	#8 @ 8"	#11 @ 6" O.C.	#8 @ 10" O.C.

NOTES:

1. C.I. FRAME WITH D.I. COVER SHALL BE CAMPBELL FOUNDRY CATALOG NO. 1511 OR APPROVED EQUAL. FOR SANITARY MANHOLE, FURNISH VENTED COVER AND CAST ALUMINUM SILT BUCKET.
2. ALL MANHOLE COVERS SHALL BE BOLTED TO THE FRAME. FOR MANHOLE COVER SYMBOLS SEE DETAIL.
3. MINIMUM INSIDE WALL DIMENSION "W" SHALL BE DETERMINED BY THE FORMULA W=(O.D./SINα)+2", BUT IN NO CASE SHALL THE DIMENSION "W" BE LESS THAN 4 FEET NOR MORE THAN 8 FEET. IN THE CASE OF A RECTANGULAR MANHOLE THE LONGER WALL SHALL BE USED FOR THE DIMENSION "W" FOR THE PURPOSE OF DETERMINING THE REINFORCING STEEL ACCORDING TO THE ACCOMPANYING TABLE.
4. OPENINGS IN THE WALLS FOR PIPE SHALL BE CAST-IN OR CUT CLEANLY WITHOUT PERCUSSION TO A MAXIMUM DIAMETER OF O.D. +3". THE SPACE BETWEEN PIPE AND WALL SHALL THEN BE FILLED WITH GROUT, OR APPROVED JOINT INSERT ASSEMBLY.
5. FOR MANHOLE STEPS, SEE MANHOLE STEP DETAIL.
6. WHERE A PIPE PASSES THROUGH A WALL 4 "A" BARS SHALL BE PLACED AT 45 DEGREES TO THE STANDARD STEEL AND SURROUNDING THE OPENING AT 1 1/2" CLEAR OF HOLE AND 5" CLEAR OF INSIDE FACE.
7. WHEN LIFTING THE PRE-CAST MANHOLE, A BAR SHALL BE PLACED HORIZONTALLY THROUGH LIFTING HOLES PROVIDED AT THE TIME OF MANUFACTURE. THE LIFTING DEVICES SHALL BE PLACED ONLY ON THAT BAR. THE BAR AND HOLES SHALL BE AS APPROVED BY THE ENGINEER. THE BAR HOLES SHALL BE FILLED WITH GROUT AFTER THE MANHOLE IS IN POSITION.
8. SPLICE LENGTHS REQUIRED FOR REINFORCING BARS: #4 BAR, 1'-4"; #5 BAR, 1'-8"; #6 BAR, 2'-0"; #8 BAR, 3'-5".
9. LOCATE MANHOLE STEPS, AND ACCESS ADJACENT TO WALL WITHOUT ANY PIPE OPENINGS. IF ALL WALLS CONTAIN PIPE OPENINGS, SELECT THE WALL WHICH HAS THE LARGEST AREA AVAILABLE FOR MANHOLE STEP INSTALLATION.

THE PORT AUTHORITY OF NY & NJ

CADD PART NAME: CIVIL STDET 010.010 AIRMH

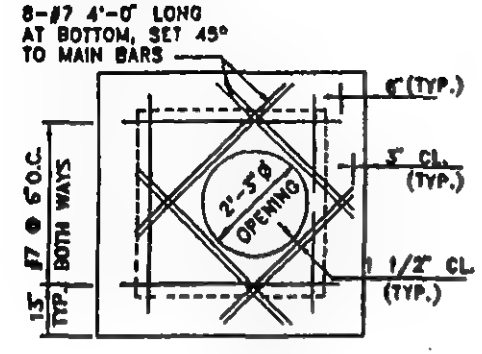
TITLE: MANHOLE AIRCRAFT

APPROVED BY: XXXX DATE: XXXX

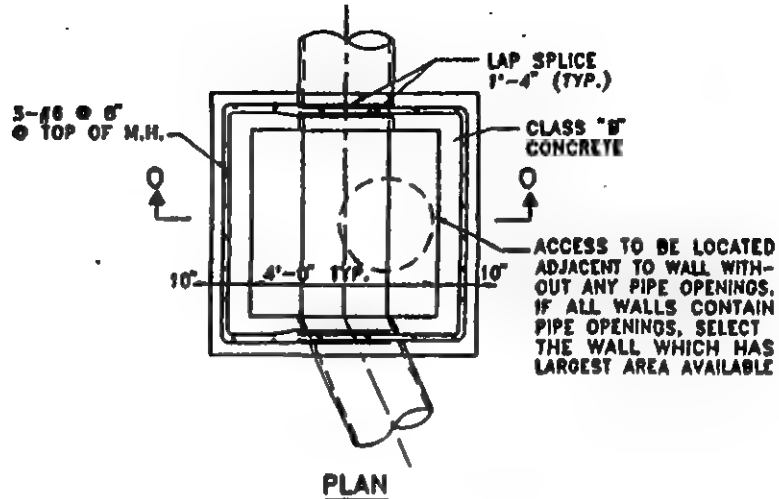
DATE CREATED: 01/02/85
DATE CHANGED & REVISED: 07/25/94 REV.3
SCALE SHOWN: NONE
SCALE VIEW: NONE
DISCIPLINE: CIVIL
SHEETS: NONE
TYPE OF PART: PARENT
FIGURE TYPE: FTE
LAYER SCHEME: 0,1,2,3,4

COMMENTS: NOTES FOR DESIGNER: DESIGN LOAD-8-747-400 GROSS WEIGHT 873,000 POUNDS. CHECK WITH GEOTECHNICAL ENGINEER THAT BEDDING IS APPROPRIATE DEPTH.

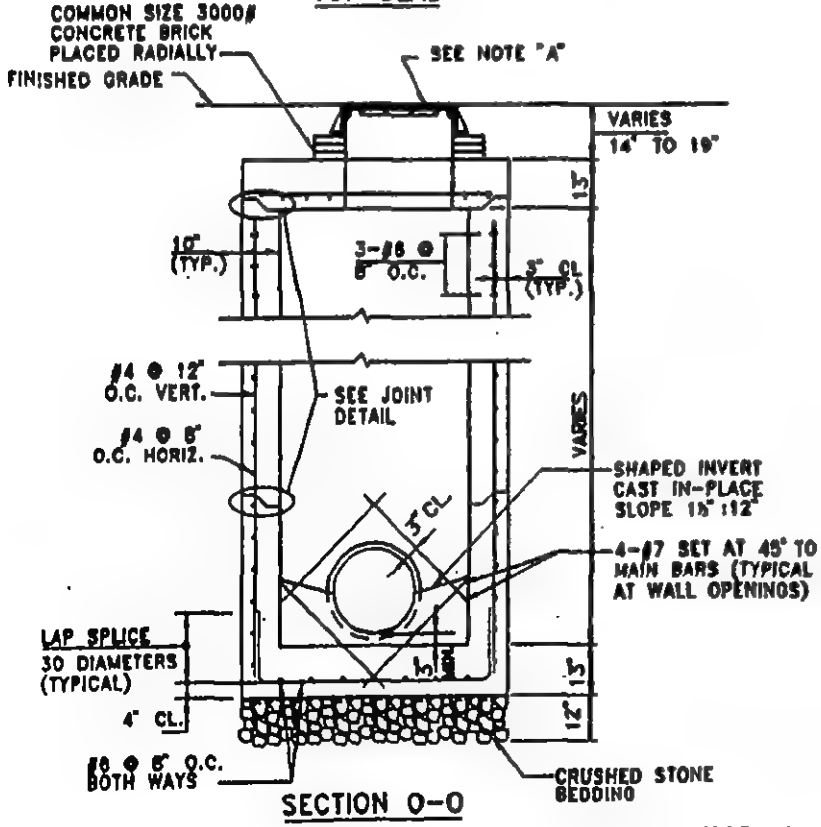
PAGE NUMBER: OF



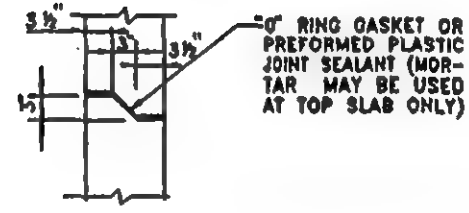
TOP SLAB



PLAN



SECTION O-O



JOINT DETAIL

NOTE "A"
CAST IRON FRAME AND BOLTED DUCTILE IRON COVER CAMPBELL FOUNDRY #1009, OR APPROVED EQUAL.

MANHOLE TYPE I PRE-CAST

010.014 PMH1

THE PORT AUTHORITY OF NY & NJ

CADD PART NAME:

CIVIL STOCK 010.014 PMH1

TITLE: MANHOLE TYPE I PRE-CAST

APPROVED BY: XXXX DATE: XXXX

DATE CREATED: 01/02/85

DATE CHANGED & REVISED: 05/14/92 RTL2

SCALE SHOWN: NONE MADE

TYPE OF PART: PARENT DISCIPLINE: CIVIL

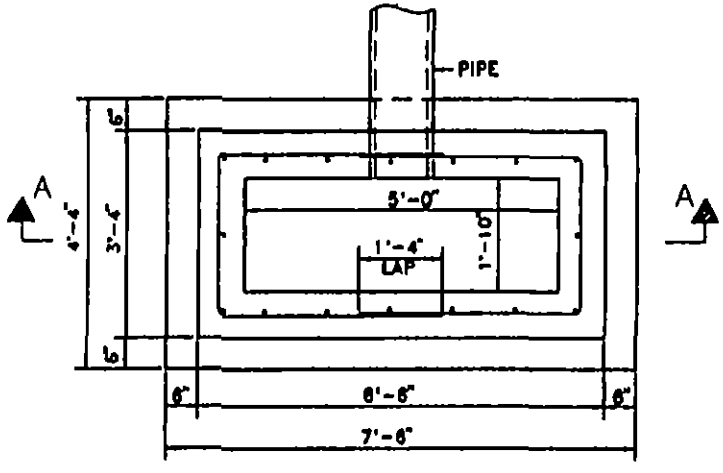
FIGURE TYPE: FTC

SCALE VIEW: NONE SHEETS

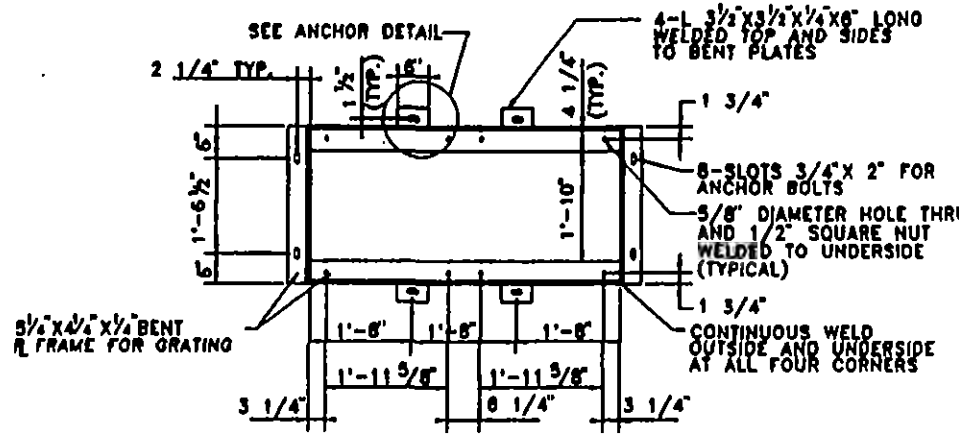
LAYER SCHEME: 0,1,2,3,4

PAGE NUMBER OF

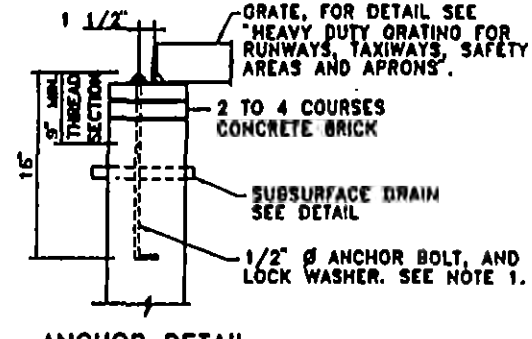
COMMENTS:
NOTES FOR DESIGNER:
FOR USE IN PORT AND MARINE TERMINAL AREAS.
CHECK WITH GEOTECHNICAL ENGINEER THAT BEDDING IS APPROPRIATE DEPTH.
DO NOT USE LADDER RUNGS.
CHECK IF VAPOR TIGHT TRAP IS REQUIRED.



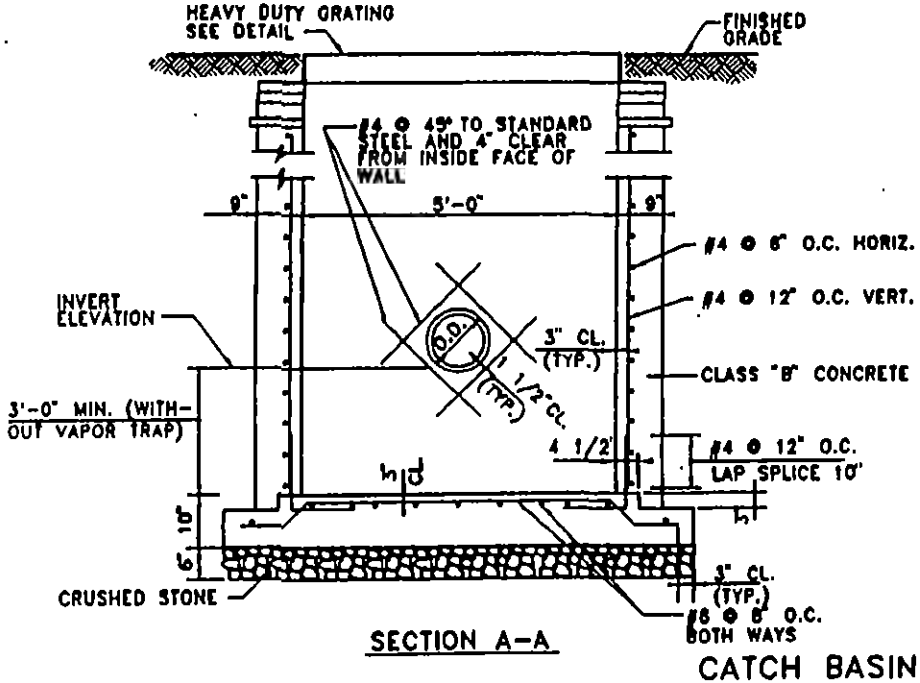
PLAN



FRAME PLAN



ANCHOR DETAIL



SECTION A–A

NOTES:

1. PAINT EXPOSED PORTION OF ANCHOR BOLTS WITH TWO COATS OF ASPHALTUM PAINT PRIOR TO INSTALLATION OF BRICK COLLAR.
2. REFER TO PLANS FOR LOCATION OF CATCH BASINS REQUIRING VAPOR TRAPS. FOR INSTALLATION DETAILS SEE VAPOR TIGHT TRAP DETAIL.
3. OPENINGS IN WALL FOR PIPE SHALL BE CAST-IN OR CUT CLEANLY WITHOUT ANY PERCUSSION TO MAXIMUM DIAMETER OF O.D. +3". THE SPACE BETWEEN PIPE AND WALL SHALL THEN BE FILLED WITH GROUT OR AN APPROVED JOINT INSERT ASSEMBLY.
4. FOR SUBSURFACE DRAINS, WHERE APPLICABLE, SEE DETAIL.

CATCH BASIN TYPE III

020.013 CBT3

THE PORT AUTHORITY OF NY & NJ

CADD PART NAME: CIVIL STDCT 020.013 CBT3

TITLE: CATCH BASIN TYPE III

APPROVED BY: XXXX DATE: XXXX

DATE CREATED: 01/02/95

DATE CHANGED & REVISED: 03/16/22 REV. 2

TYPE OF PART: PAVEMENT DISCIPLINE: CIVIL

SCALE SHOWN: NONE MODE: SCALE VIEW

FIGURE TYPE: FTG

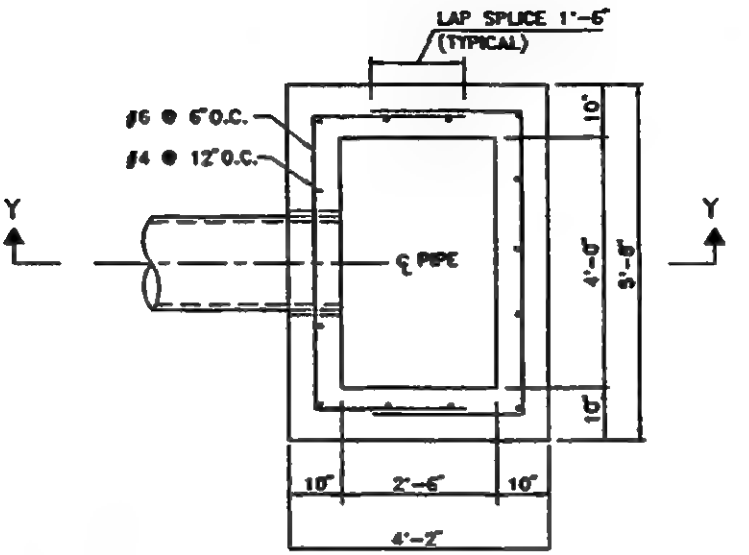
LAYER SCHEME: 0,1,2,3,4 UNITS: NONE

COMMENTS: BOEING 747-400 873,000 MAXIMUM GROSS WEIGHT DESIGN LOAD.

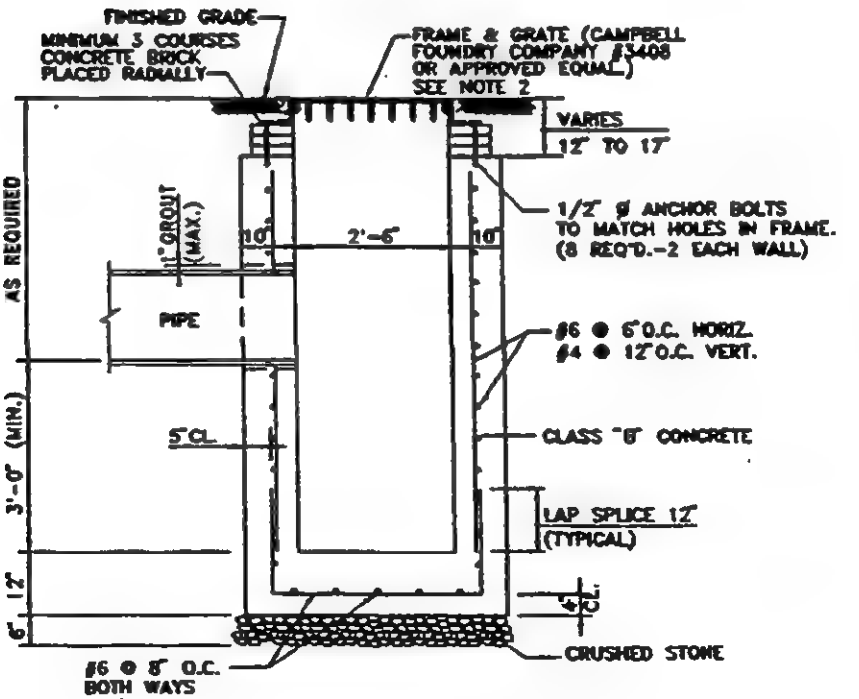
CHECK WITH GEOTECHNICAL ENGINEER THAT BEDDING IS APPROPRIATE DEPTH. CHECK IF VAPOR TIGHT TRAP IS REQUIRED.

PAGE NUMBER: OF

THE PORT AUTHORITY OF NY & NJ	DATE CREATED 01/02/85	TYPE OF PART PARENT	PAGE NUMBER OF
CADD PART NAME: CIVIL STDET 020.021 CBA	DATE CHANGED & REVISED 03/16/92 REV. 2	DISCIPLINE CIVIL	COMMENTS: FOR USE IN PORT CONTAINER AREAS. CHECK WITH GEOTECHNICAL ENGINEER THAT BEDDING IS APPROPRIATE DEPTH. CHECK IF VAPOR TIGHT TRAP IS REQUIRED.
TITLE CATCH BASIN TYPE "A" PRE-CAST	SCALE SHOWN NONE	SCALE VIEW NONE	
APPROVED BY XXXX DATE XXXX	MODE	UNITS	
	FIGURE TYPE PFIG	LAYER SCHEME 0,1,2,3,4	



PLAN



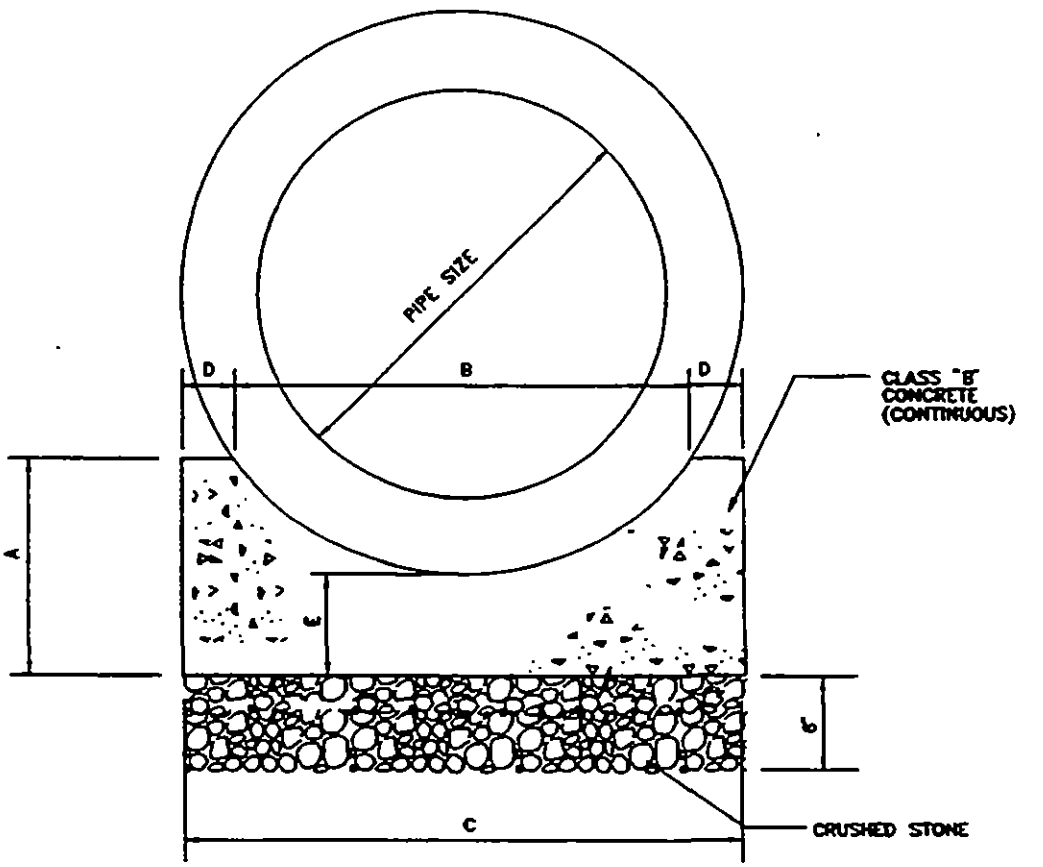
SECTION Y-Y

NOTES:
1. FOR SUBSURFACE DRAINS, WHERE APPLICABLE, SEE DETAIL.
2. GRATE SHALL BE BOLTED TO FRAME WITH MINIMUM 6 1/2" DIAMETER STAINLESS STEEL BOLTS (COUNTERSINK HOLES). FRAME SHALL BE PROVIDED WITH SLOTS FOR BOLTING TO WALLS.

CATCH BASIN TYPE "A" PRE-CAST

020.021 CBA

THE PORT AUTHORITY OF NY & NJ	DATE CREATED 01/02/85	TYPE OF PART PARENT	PAGE NUMBER OF
CADD PART NAME: CIVIL STDET 041.001 STC	DATE CHANGED & REVISED 03/16/92 REV. 2	DISCIPLINE CIVIL	COMMENTS: NOTE FOR DESIGNER: DETERMINE IF REQUIRED BY ASCE MANUAL #37 METHODS. CHECK WITH GEOTECHNICAL ENGINEER THAT BEDDING IS APPROPRIATE DEPTH.
TITLE STORM SEWER CRADLE	SCALE SHOWN NONE	SCALE VIEW NONE	
APPROVED BY XXXX DATE XXXX	MODE	UNITS	
	FIGURE TYPE PFIG	LAYER SCHEME 0,1,2,3,4	

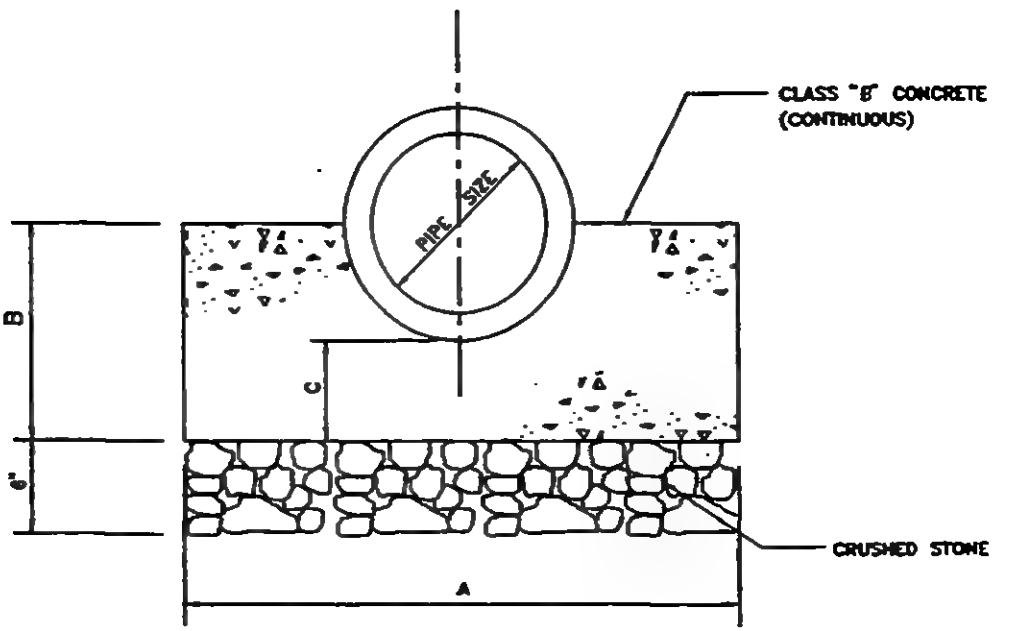


PIPE SIZE	A	B	C	D	E
24"	1' - 0"	2' - 0"	2' -10"	0' - 5"	0' - 6"
30"	1' - 1"	2' - 6"	3' - 4"	0' - 5"	0' - 6"
36"	1' - 2"	2' -10"	3' - 8"	0' - 5"	0' - 6"
42"	1' - 4"	3' - 5"	4' - 3"	0' - 5"	0' - 6"
48"	1' - 6"	3' -10"	4' -10"	0' - 6"	0' - 7"
54"	1' - 8"	4' - 4"	5' - 4"	0' - 6"	0' - 7"
60"	1' - 9"	4' - 8"	6' - 0"	0' - 8"	0' - 7"
66"	1' -11"	5' - 0"	6' - 8"	0' -10"	0' - 9"
72"	1' -11"	5' - 4"	7' - 2"	0' -11"	0' - 9"
84"	2' - 3"	6' - 4"	8' - 4"	1' - 0"	0' -10"

STORM SEWER CRADLE

041.001 STC

THE PORT AUTHORITY OF NY & NJ	DATE CREATED 01/02/85	TYPE OF PART PARENT	PAGE NUMBER OF
CADD PART NAME: CIVIL STDET 043.001 SSC	DATE CHANGED & REVISED 03/16/92 REV. 2	DISCIPLINE CIVIL	COMMENTS: NOTE FOR DESIGNER: DETERMINE IF REQUIRED BY ASCE MANUAL #37 METHODS. CHECK WITH GEOTECHNICAL ENGINEER THAT BEDDING IS APPROPRIATE DEPTH.
TITLE SANITARY SEWER CRADLE	SCALE SHOWN NONE	NONE 1" = 1'-0"	
APPROVED BY XXXX DATE XXXX	MODE	UNITS	
	FIGURE TYPE PVIC	LAYER SCHEME 0,1,2,3,4	

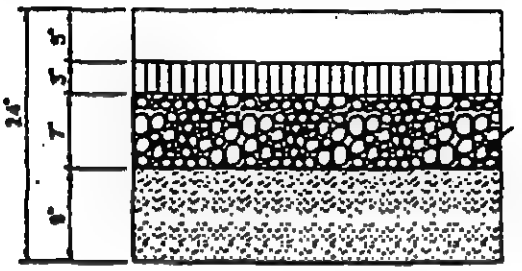


PIPE SIZE	BAR "A"	BAR "B"	BAR "C"
6"	1' - 6"	0' - 8"	0' - 5"
8"	1' - 8"	0' - 9"	0' - 5"
10"	1' - 11"	0' - 10"	0' - 5"
12"	2' - 2"	0' - 11"	0' - 5"
14" & 16"	2' - 6"	1' - 0"	0' - 6"
18"	2' - 10"	1' - 1"	0' - 6"
24"	3' - 4"	1' - 4"	0' - 6"

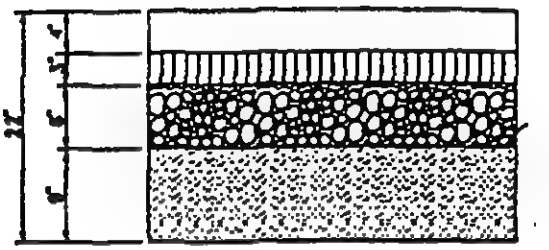
SANITARY SEWER CRADLE

043.001 SSC

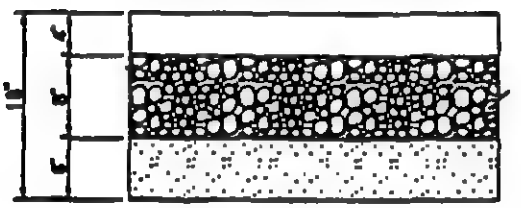
THE PORT AUTHORITY OF NY & NJ	DATE CREATED 01/02/85	TYPE OF PART PARENT	PAGE NUMBER OF
CADD PART NAME: CIVIL STDET 062.001FPSL	DATE CHANGED & REVISED 03/16/92 REV. 2	DISCIPLINE CIVIL	COMMENTS: FOR USE AT LGA ONLY. BOEING 727 DESIGN AIRCRAFT.
TITLE FLEXIBLE PAVEMENT SECTIONS - LGA	SCALE SHOWN NONE	SCALE VIEW NONE	
APPROVED BY XXXX DATE XXXX	MODE	UNITS	
	FIGURE TYPE PFIG	LAYER SCHEME 0,1,2,3,4	



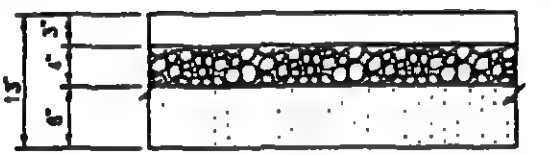
TYPE A-1
T/W



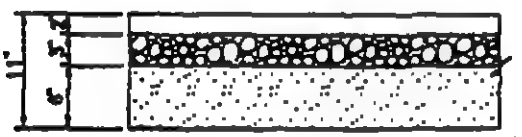
TYPE A-II
HEAVY SHOULDER



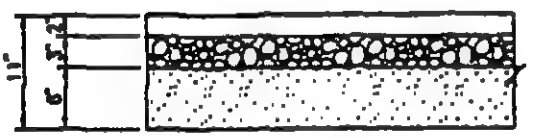
TYPE A-III
NORMAL SHOULDER



TYPE IV
HIGH VELOCITY STABILIZATION



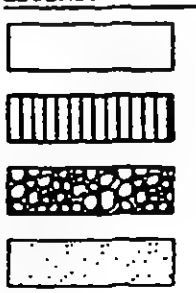
TYPE A-IV
LOW VELOCITY STABILIZATION



TYPE A-R
SERVICE ROAD

TYPE A-P
AUTO PARKING

LEGEND:



ASPHALT CONCRETE TOP COURSE

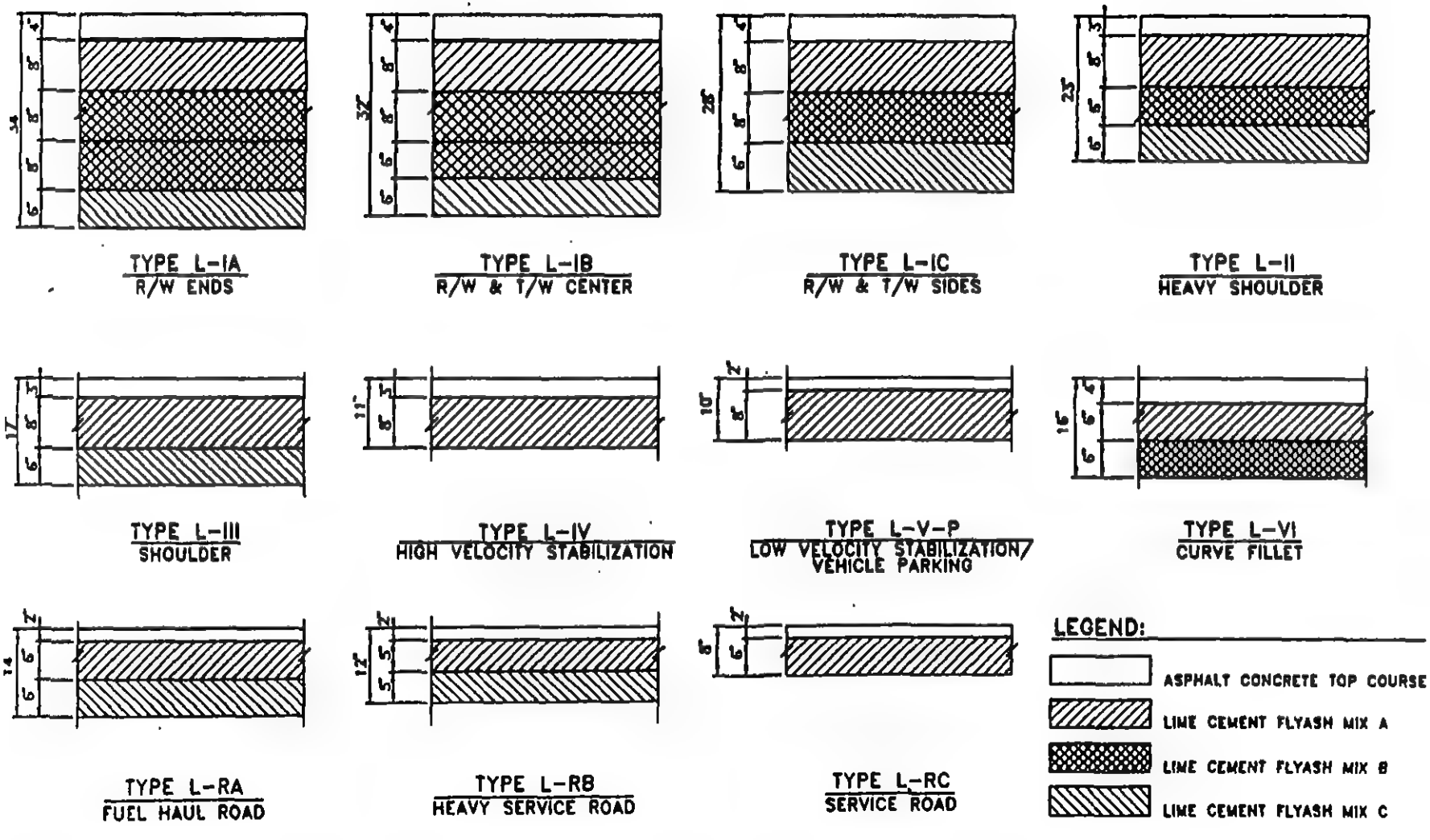
ASPHALT CONCRETE BOTTOM COURSE

PLANT MIX MACADAM

DENSE GRADED AGGREGATE BASE COURSE

FLEXIBLE PAVEMENT SECTIONS - LGA

062.001 FPSL



LIME CEMENT FLYASH PAVEMENT SECTIONS

082.003 LCFPS

THE PORT AUTHORITY OF NY & NJ

CADD PART NAME: CIVIL STDET 062.003 LCFPS

TITLE: LIME CEMENT FLYASH PAVEMENT SECTIONS

APPROVED BY: XXXX DATE: XXXX

DATE CREATED: 01/02/85

DATE CHANGED & REVISED: 03/16/92 REV. 2

SCALE SHOWN: NONE

MODE:

FIGURE TYPE: PFIG

TYPE OF PART PARENT:

DISCIPLINE: CIVIL

SCALE VIEW: NONE

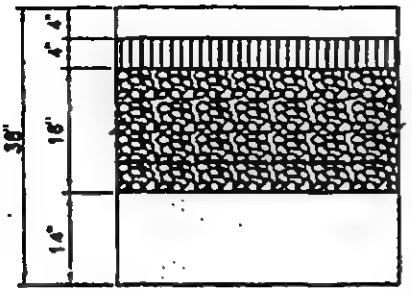
UNITS:

LAYER SCHEME: 0,1,2,3,4

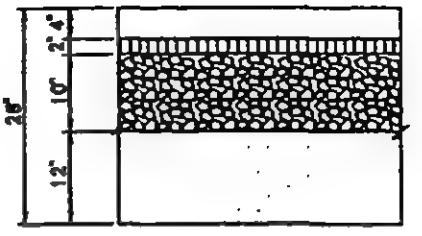
PAGE NUMBER OF

COMMENTS:
FOR USE AT JFK AND EWR.
B-747.200 DESIGN AIRCRAFT.
MAXIMUM GROSS WEIGHT 778,000 lbs.

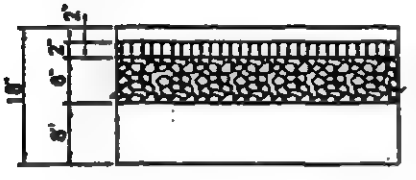
THE PORT AUTHORITY OF NY & NJ	DATE CREATED 01/02/85	TYPE OF PART PARENT	PAGE NUMBER OF
CADD PART NAME: CIVIL SIDET 062.004 FPSJ	DATE CHANGED & REVISED 03/16/92 REV. 2	DISCIPLINE CIVIL	COMMENTS: FOR USE AT JFK AND EWR. B-747.200 DESIGN AIRCRAFT MAXIMUM GROSS WEIGHT 778.000 lbs.
TITLE FLEXIBLE PAVEMENT SECTIONS - JFK/EWR	SCALE SHOWN NONE	SCALE VIEW NONE	
APPROVED BY XXXX DATE XXXX	MODE	UNITS	
	FIGURE TYPE FFIG	LAYER SCHEME 0,1,2,3,4	



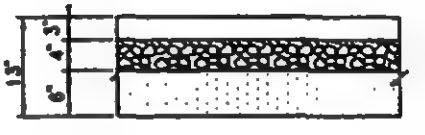
TYPE I
TAXIWAY PAVEMENT



TYPE II
HEAVY SHOULDER

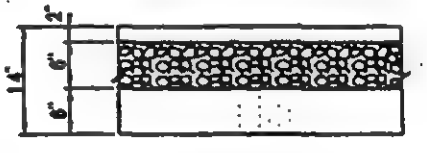


TYPE III
SHOULDER PAVEMENT

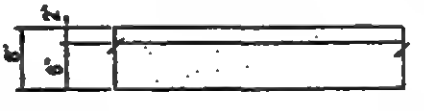


TYPE IV
HIGH VELOCITY STABILIZATION

TYPE V
LOW VELOCITY STABILIZATION



TYPE VI
FUEL HAUL ROAD



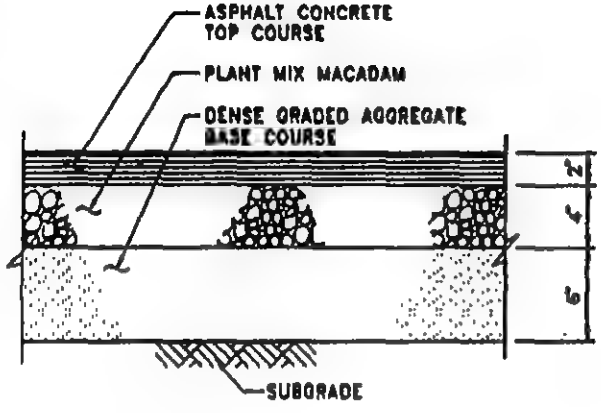
TYPE VII
AUTO PARKING

LEGEND:

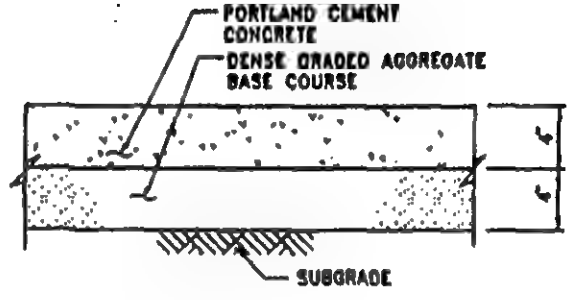
- ASPHALT CONCRETE TOP COURSE
- ASPHALT CONCRETE BOTTOM COURSE
- PLANT MIX MACADAM
- DENSE GRADED AGGREGATE BASE COURSE

FLEXIBLE PAVEMENT SECTIONS - JFK/EWR

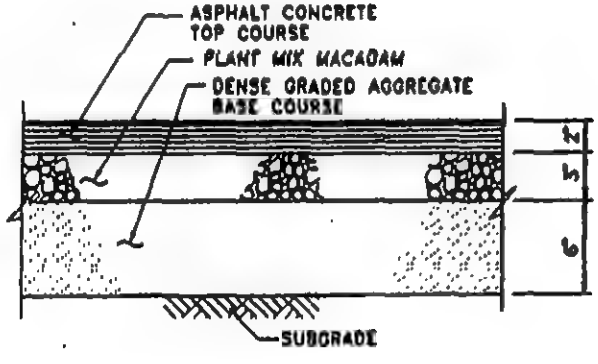
062.004 FPSJ



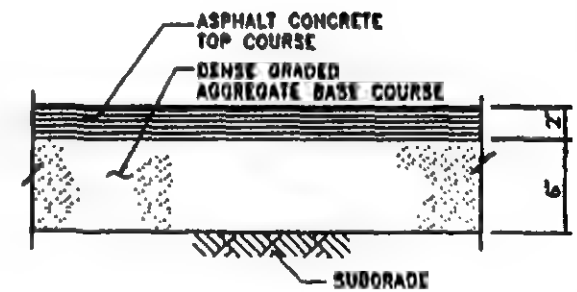
TYPE R PAVEMENT
UPLAND AREAS



TYPE PI PAVEMENT
ISLAND PAVING



TYPE PR PAVEMENT
ROADS



TYPE AP - LIGHT DUTY PAVEMENT
AUTO PARKING

PORTS-MARINE TERMINAL PAVEMENT SECTIONS
062.010 PMTP

THE PORT AUTHORITY OF NY & NJ

CADD PART NAME: CIVIL STDET 062.010 PMTP

TITLE: PORTS-MARINE TERMINAL PAVEMENT SECTIONS -LGA

APPROVED BY: XXXX DATE: XXXX

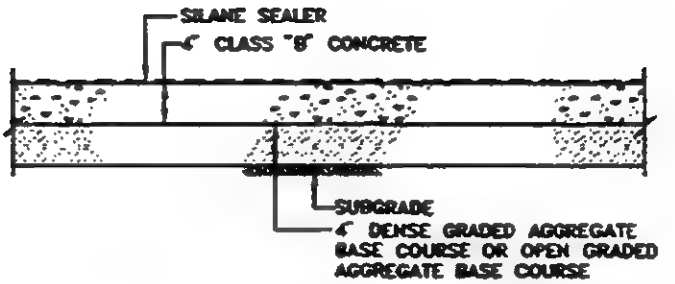
DATE CREATED: 01/02/85
DATE CHANGED & REVISED: 02/26/93 REV. 3
SCALE SHOWN: NONE
MODE:
FIGURE TYPE: PFIG

TYPE OF PART: PARENT
DISCIPLINE: CIVIL
SCALE VIEW: NONE
UNITS:
LAYER SCHEME: 0,1,2,3,4

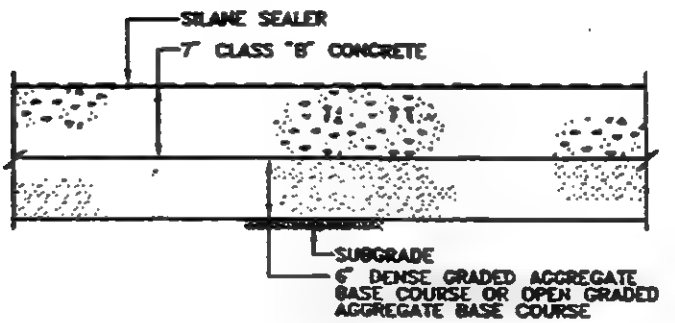
PAGE NUMBER OF

COMMENTS:
TYPE R = PORT CONTAINER AREA PAVMT.
TYPE PR = PORT ROAD PAVEMENT
TYPE PI = PAVEMENT FOR ISLAND
TYPE AP = AUTO PARKING

THE PORT AUTHORITY OF NY & NJ	DATE CREATED 01/02/85	TYPE OF PART PARENT	PAGE NUMBER OF
CADD PART NAME: CIVIL STDET 062.020 CONCSW	DATE CHANGED & REVISED 07/26/94 REV. 3	DISCIPLINE CIVIL	COMMENTS: NOTE TO DESIGNER: SIDEWALK UNDER JURISDICTION OF NEW YORK CITY HIGHWAY DEPARTMENT SHALL HAVE A 6" STONE FOUNDATION COURSE.
TITLE SIDEWALK DETAILS	SCALE SHOWN NONE	SCALE VIEW NONE	
APPROVED BY XXXX DATE XXXX	MODE	UNITS	
	FIGURE TYPE PTTC	LAYER SCHEME 0,1,2,3,4	



CONCRETE SIDEWALK



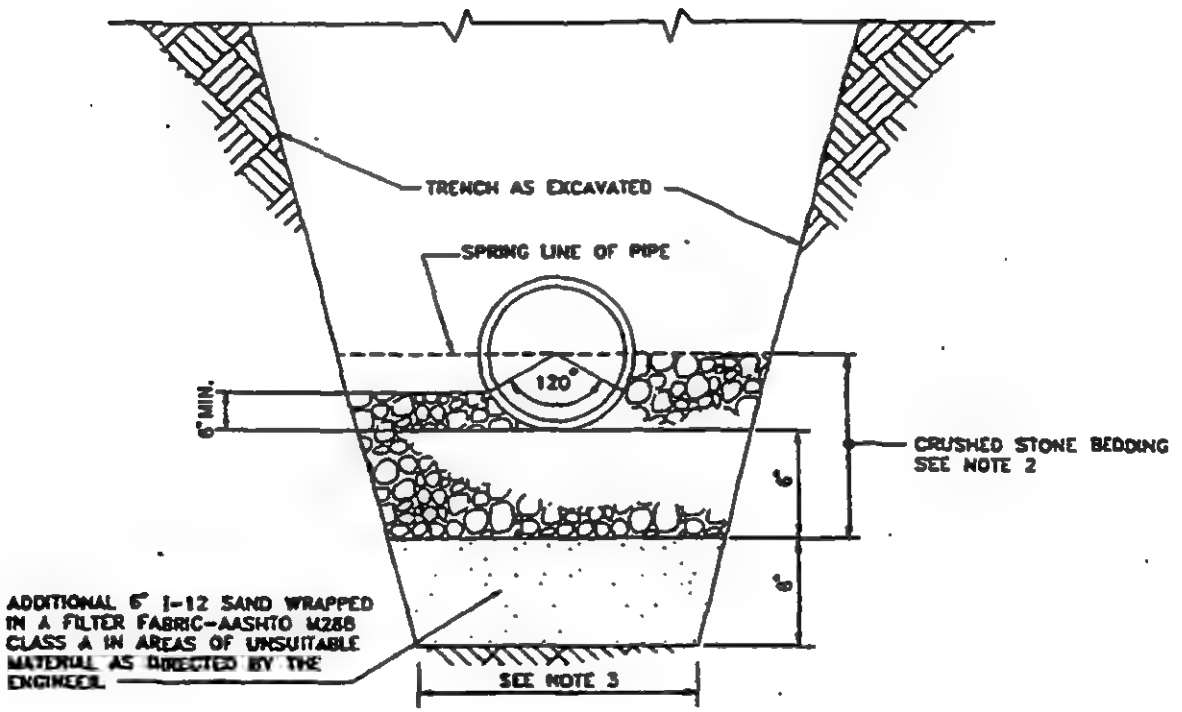
SIDEWALK CROSSING DRIVEWAY

NOTE:
THE LAYOUT OF EXPANSION AND SCORED JOINTS IN THE SIDEWALK AREA SHALL BE PROVIDED BY THE ENGINEER, UNLESS OTHERWISE SPECIFIED.

SIDEWALK DETAILS

062.020 CONCSW

THE PORT AUTHORITY OF NY & NJ	DATE CREATED 01/02/85	TYPE OF PART PARENT	PAGE NUMBER OF
CADD PART NAME: CIVIL STDET 066.001 BEDET	DATE CHANGED & REVISED 07/26/94 REV. 3	DISCIPLINE CIVIL	COMMENTS: CONSULT GEOTECH IF THE ADDITIONAL I-2 SAND IS REQUIRED. IF NOT REMOVE.
TITLE BEDDING DETAIL	SCALE SHOWN NONE	SCALE VIEW NONE	
APPROVED BY XXXX DATE XXXX	MODE	UNITS	
	FIGURE TYPE PFIG	LAYER SCHEME 0,1,2,3,4	



NOTES:

1. TRENCH SHALL BE BACKFILLED TO THE SURROUNDING EXISTING GROUND ELEVATION OR PAVEMENT SUBGRADE, WHICHEVER IS LOWER.
2. FOR FLEXIBLE PIPE BRING CRUSHED STONE TO SPRING LINE OF PIPE.
3. PIPE O.D. + 2'-0" FOR PIPES UP TO AND INCLUDING 16" I.D., 3'-0" FOR PIPES OVER 16" I.D.

BEDDING DETAIL

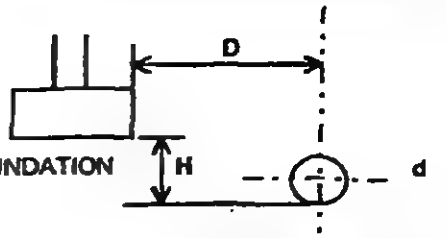
(WATER SUPPLY AND SANITARY SEWER SYSTEMS)

066.001 BEDET

REQUIREMENTS FOR PROTECTION OF STEEL, CAST IRON AND DUCTILE IRON UNDERGROUND WATER MAINS

REM - RELOCATION OR ENCASEMENT MANDATORY
STS - SUBJECT TO STUDY
NER - NO ENCASEMENT REQUIRED
R - RELOCATE
E - ENCASEMENT REQUIRED

H = 0 FOR PILE FOUNDATION
d = PIPE DIAMETER



		WATER MAINS	
		NEW	EXISTING
1	Railroads	REM	STS REM
2	Highways - Terminal Building Frontage fits in this category	REM	REM
3	Local Streets	NER	NER
4	Under Buildings		
	a. Spread footings	R	R
	b. Piles - framed slab		
	(1) Pipe < 12" dia	REM	R
	(2) Pipe > 12" dia	REM	STS
	c. Piles - slab on grade		
	(1) L.L. > 200 PSF		
	(a) Pipe > 12" dia	R	R
	(b) Pipe < 12" dia	STS	STS (R or E)
	(2) L.L. < 200 PSF		
	(a) Pipe > 12" dia	STS	STS (R or E)
	(b) Pipe < 12" dia	NER	NER
	d. Floor tied	STS	STS
5	Near Building Foundations		
	a. Where $D > 2H + 2d^2$	NER	NER
	b. Where $D < 2H + 2d^2$		
	(1) Spread footings	R	R
	(2) Piles		
	(a) Pipe > 12" dia	E	E
	(b) Pipe < 12" dia	REM	REM
6	Aircraft Loading		
	a. Runways	REM	REM
	b. Taxiways	REM	REM
	c. Taxiway stubs	STS	STS
	d. Aprons		
	(1) Greater than 6' cover	NER	NER
	(2) Less than 6' cover	STS	STS
	e. Gate positions	REM	REM
7	Stream crossings and within 10 feet of embankment	STS	STS

ATTACHMENT M1

PORT AUTHORITY BUS TERMINAL TENANT HVAC DESIGN CRITERIA

The following Design Criteria shall be used to properly size and design Tenant HVAC and smoke purge systems to meet the Port Authority (PA) Standards for the Bus Terminal.

A. GENERAL

1. The tenant HVAC systems are to be designed so that conditioned air is not taken from air conditioned public spaces.

2. The Tenant shall provide complete automatic temperature controls to control the space conditions in his area.

3. Chilled water will be shut down during the winter season.

4. Heating hot water for HVAC will be shut down during the summer season.

5. Steam for HVAC will not be provided during the summer season.

6. A time clock shall be provided for off-hours A.C. shutdown by the Tenant.

7. The Tenant shall furnish and install automatic dampers for temperature control and smoke purge requirements.

B. OUTSIDE AIR

A duct will provide each leasehold with outside air, filtered and preheated to 37°F minimum, if required. The final design criteria for the use of outside air shall be:

1.	Minimum	0.30 cfm/sf
2.	Maximum	1.2 cfm/sf
3.	Supply Pressure at connection to PA duct	Not less than 0.00 inches water

C. SPILL AIR

A spill air duct connection will be provided for each leasehold not having direct access to spill air discharge louvers, allowing for the carrying away and discharge of spill air directly to the outdoors.

Spill air CFM should equal outside air CFM less any local exhaust, and an exfiltration allowance of approximately 10% of supply air quantity.

Return or spill air fan shall be sized to satisfy the smoke purge requirements as described hereinafter under Smoke Purging; otherwise, a separate smoke purge system, including a dedicated smoke purge exhaust fan, shall be provided by the Tenant.

D. CHILLED WATER

Valved supply and return connections will be provided by the PA with a cooling capacity as follows: To maintain leasehold at 78°F, 50% RH, with 0.30 cfm/sf outside air at 91°F DB, 75°F WB, 6 watts/sf electrical load, 50 sf/person occupancy, plus solar exposure and transmission heat gain, where such exists.

Chilled water temperature: Supply is 45°F, return is 60°F. Available pressure differential between supply and return is 12 psi, and working pressure is 125 psig. The Control valve shall be two-way modulating type and valve operations shall be sized to shut the valve against a 50 psig differential. Tenant shall provide the drain piping necessary to carry the cooling coil condensate from his A/C equipment, for spillage into Tenant's own drain facility.

E. STEAM (SOUTH WING ONLY)

A valved connection for steam will be provided by the PA with 15 psig at the point of connection. A valved connection at the PA's condensate return line will also be provided by the PA for connection by the Tenant.

F. HEATING HOT WATER (NORTH WING ONLY)

Valved supply and return connections will be provided by the PA as follows:

To provide heating capacity for the Tenant HVAC system such that a leasehold is maintained at 70°F indoor temperature, with 5°F outdoor.

Heating hot water range is 180°F supply 140°F return.

Available pressure differential between supply and return is 6 psi, working pressure is 125 psif. Control valve shall be two-way modulating type, and valve operator shall be sized to shut the valve against a 50 psig differential pressure.

A baseboard radiation heating system is provided for leasehold(s) exposed to the outdoors, sized to maintain a 50°F minimum leasehold, with 5°F outdoors, when the Tenant HVAC system is not operating.

G. SMOKE PURGING

1, Fan Capacity:

The Tenant shall install a new exhaust fan to provide exhaust at a minimum of 1.5 cfm/sf or 6 air changes per hour, whichever is greater, for a store with a closed storefront, or a minimum 200 FPM velocity through an open storefront leading to the public areas, when the smoke purge is automatically or manually activated.

2. Equipment:

a. The entire smoke purge system, including exhaust fan, damper, discharge louver, duct connection to outdoors, etc., shall be furnished and installed by the Tenant.

b. Where applicable, and if adequate size is available, the existing spill air duct may be utilized as a smoke purge exhaust duct. Connection to existing spill air duct shall be provided by the tenant.

3. When the return air fan is used for smoke purge, the Tenant shall provide all necessary motorized dampers in spill and return air ducts.

4. Concourse-to-Tenant Space Make-up Air Transfer Duct:

The tenant shall provide transfer duct with backdraft damper, to permit flow of make-up air from the concourse to the tenant space during smoke purge operation. Fire damper/smoke damper shall be provided, as per Code, in the transfer duct.

H. TEMPERED OUTSIDE AIR SUPPLY

A capped connection is provided from a tempered (37°F) air duct, located in the concourse ceiling. Tenant shall furnish and install all ductwork from this connection to his A/C equipment.

I. ELECTRICAL WIRING

Refer to Attachment E1 for electrical wiring requirements for HVAC.

J. SMOKE DETECTORS

1. The Tenant shall provide smoke detectors in the return air duct, as well as downstream of the filters in the air handling unit supply duct. In addition, the Tenant shall provide area smoke detectors on the basis of a minimum of one (1) area detector per 900 sf. For requirements of duct and area smoke detectors refer to Attachment E1.

2. HVAC and Area Smoke Detectors shall:

   a. Provide an audio-visual signal at the Local Control Panel, specified herein in Attachment E1.

   b. Activate the smoke purge mode of the Tenant's A.C. system.

K. HVAC CONTROL - SMOKE PURGE MODE

1. Automatic Smoke Purge Cycle:

Upon activation of an HVAC or area smoke detector, an alarm shall be initiated, the supply air fan shall stop, the outside air and return air dampers shall close, the spill air damper shall open fully, and the return air fan, if designated as a smoke purge fan, shall keep running; otherwise it shall also stop, and the dedicated smoke purge fan shall start, bypassing all other controls.

In the event that activation of the area smoke detector(s) occurs at night when the A.C. system is off, the return air fan, if designated as a smoke purge fan, or the dedicated smoke purge fan shall start, and the dampers shall be positioned as described above.

2. Manual Smoke Purge Cycle:

   a. Local Manual Control shall originate from the Local Control Panel, specified in Attachment E1.

   b. Provision shall also e made for accomplishing the Tenant's smoke purge cycle remote-manually from the Manual Pull Station, specified herein in Attachment E1.

L. LOCAL CONTROL PANEL AND EMERGENCY POWER SUPPLY

For requirements for the Local Control Panel, and for the emergency Power Supply to the Local Control Panel, refer to Attachment E1.

M. MANUAL PULL STATION/BREAK GLASS EMERGENCY SWITCH (TENANT SPACES)

Install a manual pull station with break glass rod. For requirements refer to Attachment E1.

N. KITCHEN EXHAUST

Tenants requiring kitchen exhaust systems shall provide New York City approved hoods, ductwork, grease/vapor removal devices and fire extinguishing equipment.

ATTACHMENT E1
PORT AUTHORITY BUS TERMINAL TENANT ELECTRICAL DESIGN CRITERIA

A. ELECTRICAL SERVICE OPTIONS

1. Rent Inclusion:

Tenant shall furnish and install a 265/460 or 208/120 volt feeder in a conduit sized for the anticipated Tenant load, from the Bus Terminal point of electrical distribution to the perimeter of the leasehold, and terminate in a junction box. All electrical distribution, step-down transformers, wiring, panels, boxes, and lighting shall be provided by the Tenant.

2. Metered Service:

Tenant shall furnish and install a conduit sized for the anticipated Tenant load, and terminate in a junction box. Install the conduit from the 265/460 or 208/120 volt Tenant Switchboard to the perimeter of the leasehold. All electrical distribution, step-down transformers, wiring, panels, boxes, and lighting, shall be provided by the Tenant. The Tenant shall be required to furnish and install a 200A, 3 phase, 7 point bypass meter pan whenever a metering system does not exist for a location, or when the existing meter pan is not sufficient for the Tenant's load.

B. TELEPHONE SERVICE

An empty conduit shall be installed by the tenant from the Bus Terminal point of telephone distribution to the perimeter of the leasehold.

C. CONDUITS AND CONDUCTORS

1. Conduits

a. Minimum conduit size shall be 3/4-inch.

b. Maximum EMT size shall be two (2) inches.

c. All outdoor, exposed conduit shall be rigid galvanized steel.

d. PVC conduits shall not be installed in any indoor area.

2, Conductors

a. General

i. Minimum wire size for power shall be #12 AWG, copper.

ii. PVC insulation shall not be allowed except for communications systems, remote control, signaling, and power-limited circuits.

b. Fire Alarm

All fire alarm cables shall be New York City approved, shielded, twisted pair #14 AWG, solid copper, 200-degree C, 600V, except control circuits shall be unshielded.

D. GROUNDING

1. Whenever a grounding conductor is required (including feeders to motor loads greater than 1/8-horsepower), a separate ground wire shall be installed.

2. Ground-fault protection shall be provided for all receptacles and equipment located near running water, such as electrical water coolers.

E. TENANT FIRE ALARM SYSTEM

1. General:

a. The design of Tenant fire alarm systems shall be consistent with the Building Code of the City of new York and the Electrical Code of the City of New York, and shall be consistent with the existing Bus Terminal Life Safety System.

b. The Tenant Fire Alarm Systems shall utilize both automatic and manual initiating (detection) devices and audible and visual notification (signaling) appliances:

i. Systems may utilize either conventional or multiplex technologies. The use of addressable/intelligent systems is required.

ii. In cases where microprocessor software programmable systems are utilized, a fully functional and manufacturers licensed copy of the software program, manuals, and accessories shall be provided to the Port Authority as part of the system.

iii. In all cases the occupants of the facility shall be able to clearly hear, and as required, clearly see the system alarm signal(s).

iv. All system components (Detectors, Signals, Modules, etc.) shall be UL Listed and Cross Listed for use with the System Control Panel.

c. Power to the smoke detection and fire alarm equipment shall be taken via fused cutouts connected to the line terminals of the nearest emergency electrical panel.

2. The Tenant Fire Alarm System shall be fully compatible with the existing Bus Terminal System Model MXL as manufactured by Cerberus Pyrotronics.

G. HVAC SMOKE DETECTORS

1. The Tenant shall provide smoke detectors in the HVAC systems which have been listed by Underwriters Laboratories, and approved by the New York City Building Department for the particular application. Detectors shall sense products of combustion. Detectors shall not be subject to an alarm due to the rapid change of humidity. The quality and quantity of ionization material shall be such that it shall not be considered dangerous if lost, nor shall it require licensing from the Nuclear

Regulatory Commission. All of the detectors shall have their locations and operations as described in the HVAC Design Criteria, Attachment M1.

2. The "ion chamber" duct detector shall be Cerberus Pyrotronics Model ILI-1B with a Model AD-X3RI housing.

H. AREA SMOKE DETECTORS

1. The Tenant shall provide an "ion chamber" smoke detector over each leasehold entrance to the public corridor. Detector(s) shall sense "product-of-combustion" gases and shall have an operation as described in the HVAC Design Criteria, Attachment M1.

2. The "ion chamber" area detector shall be Cebreris Pyrotronics Model ILI-1 with a DB-35 base.

I. LOCAL CONTROL PANEL AND EMERGENCY POWER SUPPLY

1. The Local Control Panel shall be Model MXL-IQ as manufactured by Cerberus Pyrotronics and shall be fully compatible with the Bus Terminal Life Safety System.

2. Emergency Power Supply for Local Control Panel shall be Model Number BP-61 as Manufactured by Cerberus Pyrotronics.

3. The Local Control Panel shall be wired with provisions for tie-in with the Building's Life Safety System. Tenant shall provide conduit and wire to the nearest point of connection to the Building Life Safety System. Terminations to the Building Life Safety System shall be performed by the Port Authority.

4. All "Tenant-desired" sprinkler alarms shall be wired to addressable device adapter modules Cerberus Pyrotronics Model TRI-B6.

J. EMERGENCY SMOKE PURGE MANUAL PULL STATION

1. The Tenant shall install a manual pull station with break glass rod, provided with an engraved nameplate with the legend "EMERGENCY SMOKE PURCE". The pull station shall be Model MS-MI with MS-GR glass rod and MS-SB surface-mounted backbox as manufactured by Cerberus Pyrotronics.

b. For Smoke Purge Activation, See Attachment M1.

K. SPRINKLER ALARMS

Sprinkler alarms have been provided by the Port Authority. However, should the tenant require his own internal alarm, he must conform to the section titled "Local Control Panel and Emergency Panel Supply."

ATTACHMENT F1

NEW YORK CITY MUNICIPAL FIRE ALARM AT LGA AND JFK

I. GENERAL

A fire alarm box shall be furnished and installed as shown on the contract drawings. The box shall be mounted on a pedestal.

II. COORDIANTION WITH THE NEW YORK CITY FIRE DEPARTMENT (NYCFD)

A. The Tenant's contractor shall contact the NYCFD, Bureau of Fire Communications, Queens Coordinator, located at 104 Duane Street, New York, New York, Telephone (212) 374-5866, for information on materials to be obtained, their cost, and also to notify the coordinator of the commencement of work.

1. The coordinator will determine the cost and instruct the contractor where to forward the required certified check as advance payment for materials, as well as the procedure for obtaining the necessary materials from the Fire Department Storehouse located at 87 Union Street, Brooklyn, New York.

2. The pedestal, subbase, terminal box, and gasket are among the materials that shall be obtained by the contractor from the Fire Department Storehouse.

B. Installation of the fire alarm mechanism, as well as all "live" electrical connections, will be performed by the NYCFD.

III. RELEVANT DOCUMENTS

A. Pedestal base sketches SK-FA-1 and SK-FA-2.

B. NYCFD signal cable specifications:

City of New York Fire Department Fire Alarm Cable.

City of New York, Department of Purchase.

Cable Specification Number 12-C-9: 61T, Tentative Standard.

Fire Alarm signal cable; polyethylene insulated, polyvinyl chloride jacketed.

IV. SUBMITTALS TO THE PORT AUTHORITY

In order for the P.A. to obtain New York City Fire Department approval of the proposed fire alarm installation, three (3) sets of the following information are required to be sent to the P.A., via the Tenant's Alteration Application:

A. A plot plan of the building showing the exact location of all the fire alarm boxes and their relationship to site conditions; i.e., roads, sidewalks, fences, islands, building exits, etc.

B. Details of the fire alarm box, pedestal, foundation, cable and duct installation, etc.

C. Specifications for fire alarm equipment, cable installation procedures, etc.

D. The above may be submitted in the form of contract drawings, sketches, and formal specifications, for proper transmittal by the P.A. to the New York City Fire Department.

V. INSTALLATION

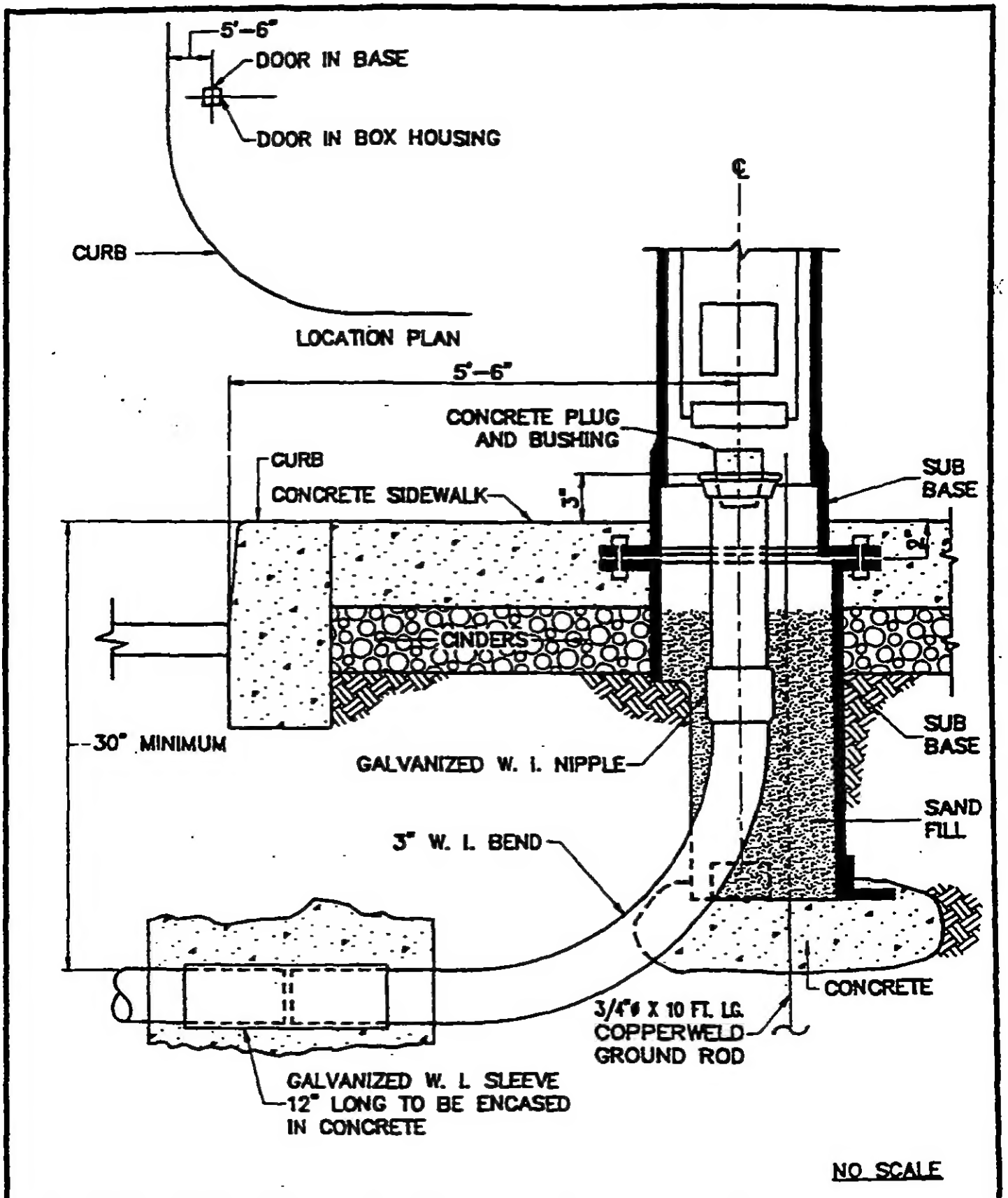
A. The Tenant's Contractor shall notify the Queens Coordinators, NYCFD Bureau of Fire Communications, 48 hours prior to commencement of work on the fire alarm system.

B. The Contractor shall protect and maintain the existing fire alarm system; and all workmanship, equipment, and materials used in connection with the New York City Fire Alarm System shall comply with the requirements of the NYCFD Bureau of Fire Communications.

C. A ground rod shall be installed in an approved manner and the ground connection thereto shall be accessible to inspection and test. Maximum resistance to ground at the ground rod shall be 25 ohms.

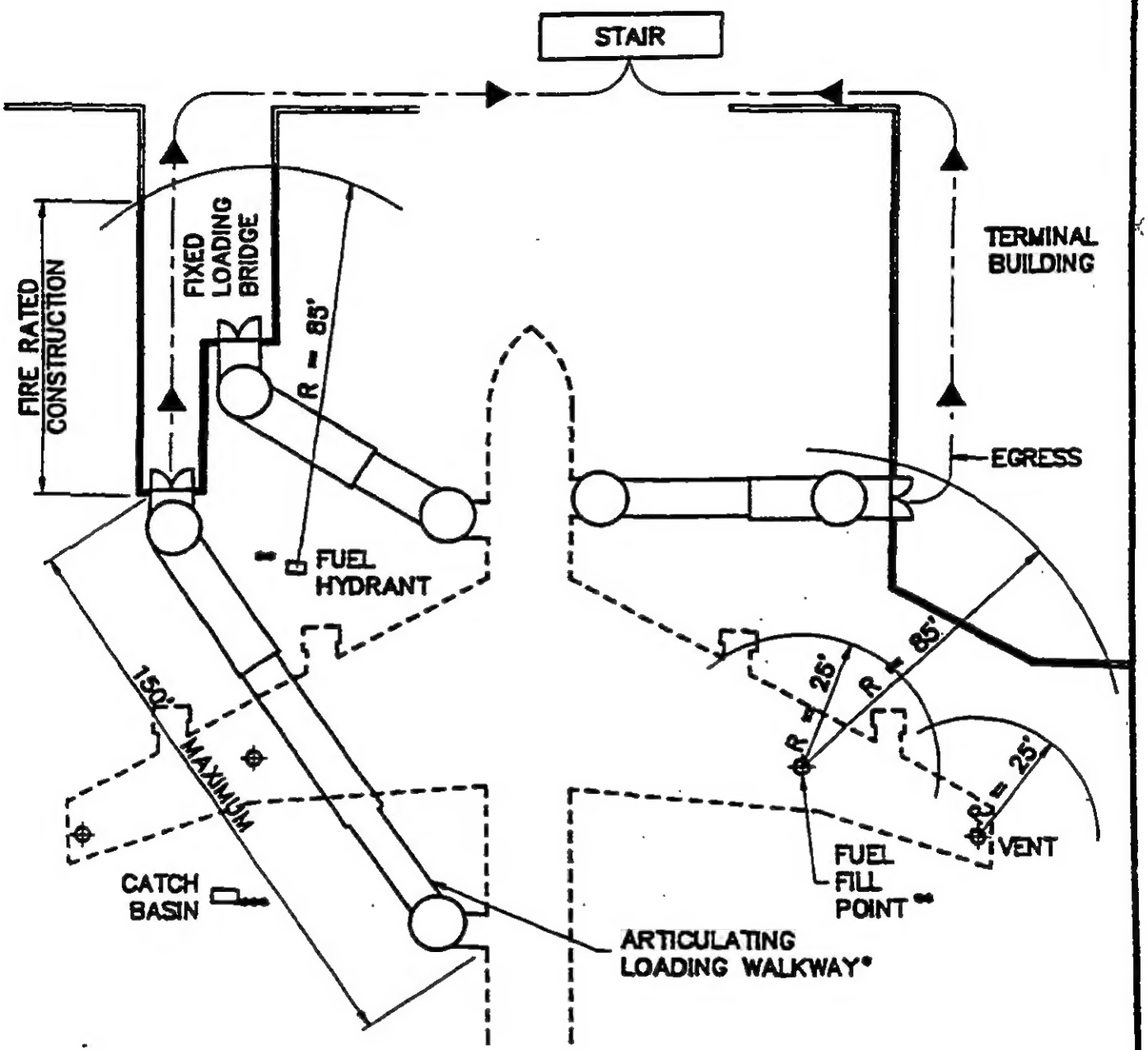
D. Code wheel designations for the New York City fire alarm boxes shall be obtained from the NYCFD.

E. At John F. Kennedy International Airport, code wheel designations for the proprietary fire protection system shall be obtained from the Manager, Airport Facilities Division.



PEDESTAL BASE
FOR FIRE ALARM POST IN SIDEWALK
(NEW YORK CITY FIRE DEPARTMENT)

SK-FA-2



NOTES:

* Loading Walkways – see Sections 6–IV–F and 13–IV–B of this Manual.

** For Clearance of points of potential fuel spillage see Section 13–IV–A of this Manual.

*** Catch basins – see Section 8–III–C of this Manual.